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# WAR MACHINE

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The Vickers in Action

Light Machine-Gun Tactics 1915-1918

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A fully illustrated guide to Machine-Guns of World War I

# WAR MACHINE

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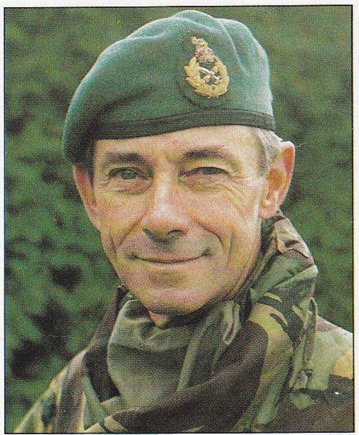

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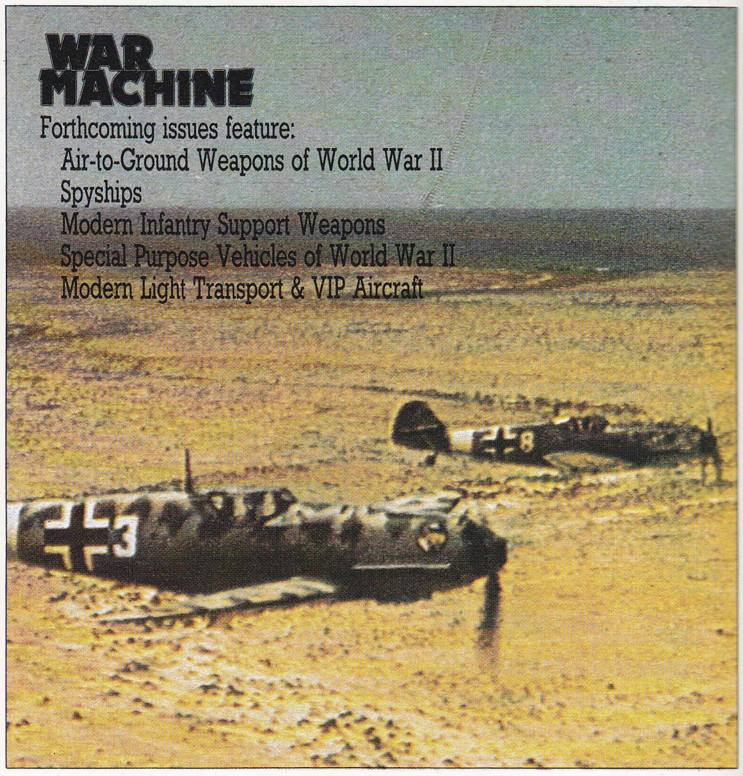

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# Machine-Guns of World War 1

*Indian Army soldiers in France fire a Hotchkiss Mk 1 from a position very like the sangars of the North West Frontier. The strip feed used on the Hotchkiss machine-gun can be clearly seen, as can the cooling fins around the barrel.*

***World War I differed in kind and degree from any previous human conflict. It was the first true industrial war, in which more men were killed in battle than ever before. The two paramount weapons were artillery and – the scourge of no-man's land – the machine-gun.***

During World War I the machine-gun dominated the battlefields in a manner that is now difficult to comprehend. In fact it would be safe to say that the machine-gun dictated the very way in which World War I was fought, and this dominance of a tactical situation by a single weapon spurned the development of novel weapons to counter that same machine-gun.

Throughout World War I military planners sought desperately to overcome the power of the machine-gun. Time and time again prolonged artillery bombardments battered an enemy defensive system until it seemed that nothing could survive, but every time the hapless infantry moved forward from their trenches there seemed always to be a machine-gun that could prevent further progress. Thus it was that the artillery destroyed while the machine-gun killed. But in tactical terms many of these machine-guns were large and heavy weapons that could not be moved easily or rapidly, and a new family of lighter machine-guns was devised even as the war continued. It was these light machine-guns that were partly able to break the pattern of static emplacements and massed frontal assaults, by allowing the evaluation of a new tactical situation in which relatively mobile infantry could supply a fair proportion of their own fire support where and when it was most needed. Even so, it should not be forgotten that despite all the dreadful success of the machine-gun it was the arrival of the tank that finally did away with the mincing-machine apparatus of trench warfare on the Western Front.

Included in this study are some superb examples of machine-gun design, ranging from the magnificent Vickers machine-gun and the sturdy PM1910 to the dreadful Chauchat. All the weapons included here used some mechanical devices that tested the skills of designers and metallurgists alike, and the results were often technical marvels of their day. Many of the weapons mentioned here would still be viable in any form of combat were it not for the fact that they have been replaced by new and yet more powerful generations of weapons.

*French and British soldiers operate together, with a Hotchkiss mle 1900 ready to provide fire support. This 1918 scene reflects the return to mobile warfare which preceded the end of the war and at last brought the machine-gun out of the trenches. It would have been inconceivable only six months before.*

FRANCE

# Hotchkiss mle 1909

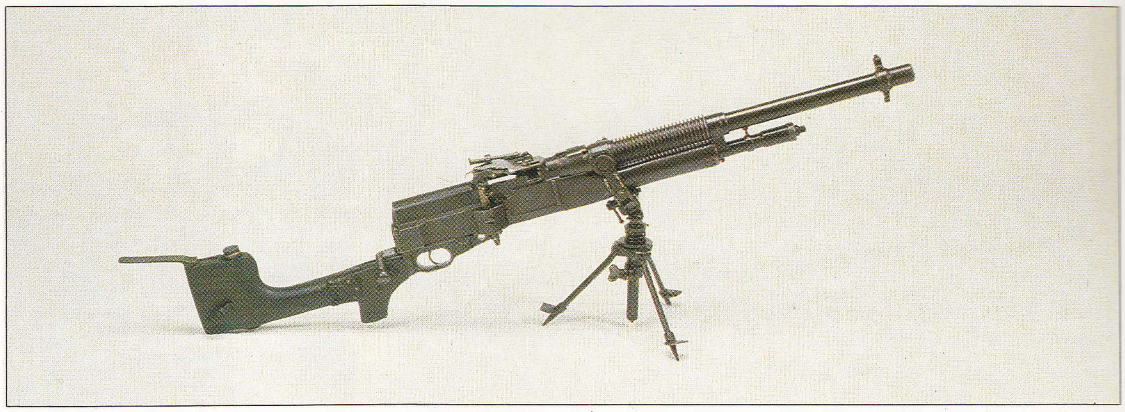
In the years up to 1914 the French army was trained in the tenet that the attack (or the offensive) was the key to victory in any future war. The infantry and cavalry were trained to attack at all times, overcoming any opposition by the force of their onslaught and by their determination. In this optimistic scenario the machine-gun hardly featured, but at one point in the early 1900s it was thought that some form of light Hotchkiss machine-gun would be useful for cavalry units, and might also be portable enough for attacking infantrymen to carry.

The result of this suggestion was the **Fusil-mitrailleur Hotchkiss mle 1909**, which used the basic gas-operated mechanism of the larger Hotchkiss machine-guns, though for some reason the ammunition feed was complicated further by inversion of the ammunition feed strip mechanism. When it was introduced the cavaly units did not take to the weapon at all and it proved to be too heavy for infantry use, so the numbers produced were either relegated to use in fortifications or stockpiled. However, export sales of the mle 1909 were more encouraging for the weapon was adopted by the US Army who knew it as the **Benét-Mercié Machine Rifle Model 1909**; it was used mainly by cavalry units.

When World War I began the mle 1909 was once more taken from the stockpiles, and it was even adopted by the British army as the **0.303-in Gun, Machine, Hotchkiss, Mk 1** in an attempt to get more machine-guns into service. The mle 1909 was produced in the United Kingdom chambered for the British 7.7-mm (0.303-in) cartridge and in British use many were fitted with a butt and a bipod in place of the original small tripod located under the centre of the gun body.

However the mle 1909 was not destined to be used very much in the trenches: the ammunition feed was a constant source of troubles and gradually the Hotchkiss was diverted to other uses. The mle 1909 in its several forms became an aircraft gun and it formed the main armament of many of the early tanks such as the British 'Female' tanks with their all-machine-gun armament, and the little Renault FT17. On the tanks the ammunition feed strips sometimes limited the traverse available inside the close confines of the tank mountings, so many guns, especially those of the British, were converted to use the three-round linked strips intended for use on the larger Hotchkiss mle 1914. Some of these guns were still in British army use in 1939, and more were later taken from the stockpiles for use as airfield defence weapons and for arming merchant shipping.

The mle 1909 was one of the first light machine-guns, but it had little impact at the time, although it was used in quite large numbers. Its main disadvantage was not so much a technical difficulty as a tactical problem, for the tactics involved in trench warfare of the period and the lack of appreciation of the potential of the weapon never gave the mle 1909 a chance to shine. As a tank weapon it made its mark on history, but it was less successful as an aircraft gun, the feed strip mechanism proving a definite drawback in an open aircraft cockpit.



*Above: The Hotchkiss mle 1909 was used by the French, the British (as the Hotchkiss Mk 1) and also by the US Army, who knew it as the Benét-Mercié.*

*Below: A drummer of the 1/7th Lancashire Fusiliers demonstrates a Hotchkiss Mk 1 to newly-arrived US Army soldiers in France in May 1918.*

## Specification

**Fusil-mitrailleur Hotchkiss mle 1909**

**Calibre:** 8 mm (0.315 in)

**Lengths:** overall 1.19 m (46.85 in); barrel 600 mm (23.62 in)

**Weight:** 11.7 kg (25.8 lb)

**Muzzle velocity:** 740 m (2,428 ft) per second

**Rate of fire:** (cyclic) 500 rpm

**Feed:** 30-round metal strip

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FRANCE

# Hotchkiss medium machine-guns

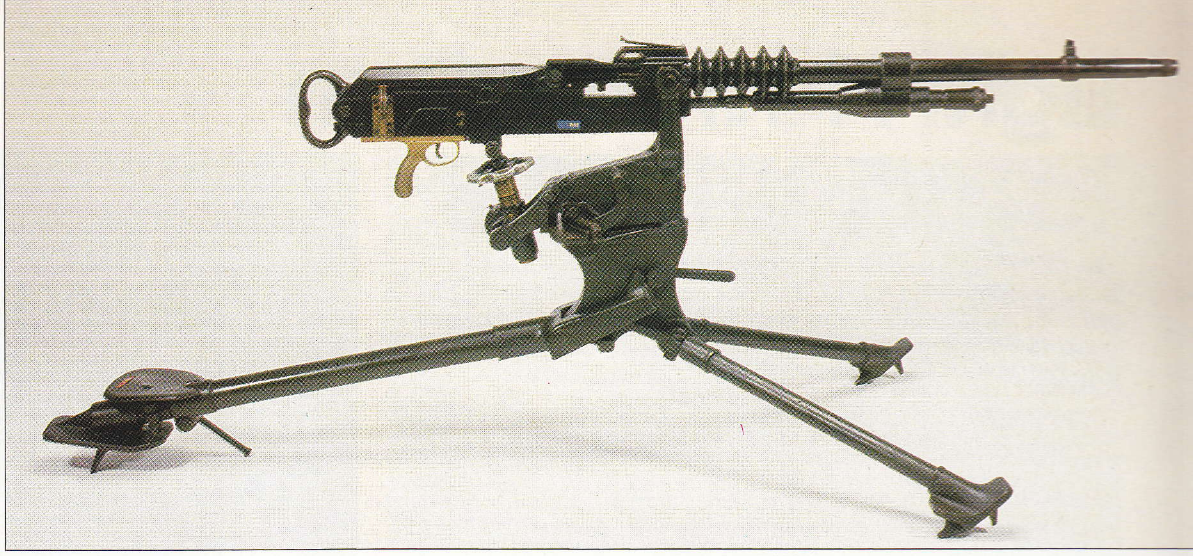
In the 1890s the only viable machine-guns were those produced by Maxim and Browning, both of whom wrapped their products in a tight wall of patents to prevent others enjoying the fruits of their invention. Many armament concerns were desperate to find some way of getting around the patent wall, and one of these was the French Hotchkiss company. Thus when it was approached by an Austrian inventor who described to them a novel method of gas operation to power a machine-gun, the invention was quickly purchased and developed by Hotchkiss.

The first Hotchkiss machine-gun was the **Mitrailleuse Hotchkiss mle 1897**, and although this model was hardly a viable service weapon it was the first gas-operated machine-gun. This was followed by the **mle 1900** and later by the **mle 1914**, the latter being the model mainly used in World War I. These models all had air-cooled barrels, but as these tended to overheat the company very quickly introduced a feature that was to remain as a virtual 'trademark' of the Hotchkiss machine gun: this consisted of five prominent 'doughnut' collars around the end of the barrel closer to the receiver. These rings (sometimes brass and sometimes steel) enlarged the surface area of the barrel at the point where it became hottest and thus provided greater cooling.

For operating, gas was tapped off from the barrel and used to push back a piston to carry out all the various extracting and reloading operations. It was a system that worked well and reliably, and was soon to be used in one form or another by many other machine-gun designers. The weapon had its first exposure to action during the Russo-Japanese War of 1904-5, in

*French and British infantry at the Battle of the Aisne in 1918 in the follow-up to the Allied advance. The gun is a Hotchkiss mle 1900 mounted on the mle 1916 tripod, with ammunition boxes close to hand behind the gunner. To the left of the gun are two ammunition handlers ready to assist.*

*Easily recognized by the large doughnut cooling rings around the barrel, the Hotchkiss mle 1914 became the standard French heavy machine-gun of World War I. Although heavy, it was well made and generally reliable, but the strip feed sometimes gave trouble. It fired an 8-mm (0.315-in) round.*



which it performed well enough though one feature did cause trouble. This was the ammunition feed, the Hotchkiss using a method whereby the rounds were fed into the gun mounted on metal strips; originally brass strips were used, but these were later replaced by steel strips. These strips carried only 24 or 30 rounds, which severely limited the amount of sustained fire that could be produced. On the mle 1914 this was partly overcome by redesigning the strip system to give three-round strips linked together to form a 249-round 'belt'. Even in this form the strips were prone to damage and any dirt on them tended to cause jams. The feed mechanism was thus the weakest point in an otherwise reliable and serviceable design.

There were some variations on the basic design. Versions for use in fortifications had a downwards 'V'-shaped muzzle attachment that was supposed to act as a flash hider, and several types of tripod were in use during World War I, including a mle 1897 mounting that had no provision for traverse or elevation.

The Hotchkiss machine-guns were used mainly by the French army during World War I, but in 1917 large numbers were handed over to the American Expeditionary Force when it arrived in France. The Americans continued to use them until the war ended.

### Specification
**Mitrailleuse Hotchkiss mle 1914**

**Calibre:** 8 mm (0.315 in)
**Lengths:** overall 1.27 m (50 in); barrel 775 mm (30.51 in)
**Weight:** gun 23.6 kg (52.0 lb)
**Muzzle velocity:** 725 m (2,379 ft) per second
**Rate of fire:** (cyclic) 400-600 rpm
**Feed:** 24- or 30-round strip, or 249-round strip in 3-round links

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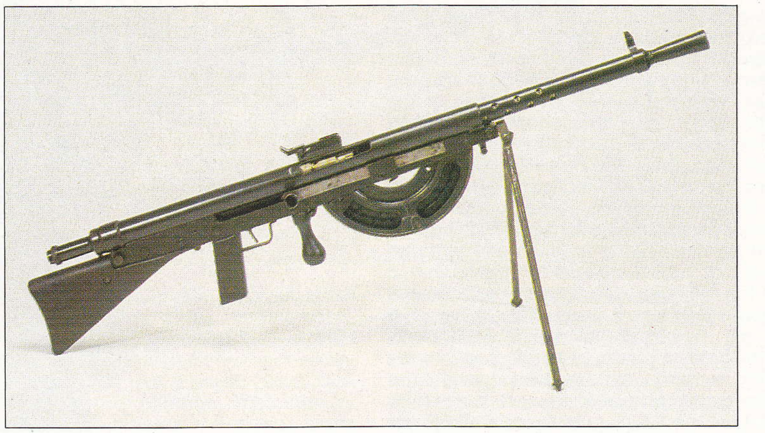
FRANCE

## Chauchat

Officially known as the **Fusil-Mitrailleur mle 1915**, the **Chauchat** or **CSRG** is one of the more unpleasant weapon production stories of World War I. It was intended as a light machine-gun, and was created by a commission of designers in 1914, the result being a long and awkward weapon using a mechanism known as 'long recoil' in which the barrel and breech block moved to the rear after firing, the barrel then being allowed to move forward while the bolt is held and released later to feed the next round. This mechanism works, but is rather complicated and the movement inside the gun makes aiming difficult.

The Chauchat was apparently intended for ease of manufacture, but when the design was rushed into production in 1915 its manufacture was hived out to a large number of firms, some of whom had virtually no weapon-manufacturing experience. The result was a horror, for many manufacturers used the Chauchat simply as a means of making maximum profit and so used cheap and unsuitable materials that either wore out quickly or broke in action. Even when the materials were suitable the service versions of the Chauchat were still bad: the weapon handled badly and tended to jam at the slightest excuse. The half-moon magazine under the body did little to make the weapon easier to carry, and the light bipod was so flimsy that it bent very easily. The French soldiers hated the weapon, many later proclaiming that the manufacturers' greed for profits had caused the deaths of many French soldiers, as they no doubt had.



*The Fusil-Mitrailleur mle 1915 or 'Chauchat' was one of the worst machine-guns ever built and was reviled by the soldiers who had to use it in action.*

Unfortunately, the manufacturers were not alone in their search for weapon production profits. When the Americans entered the war some French politicians prevailed upon the US Army to adopt the Chauchat, and the unsuspecting Americans agreed. They accepted over 16,000 Chauchats and a further 19,000 were ordered of a version chambered for the American 7.62-mm (0.3-in) cartridge; this model had a vertical box magazine instead of the French half-moon magazine. Neither of these versions proved to be any better in American hands than they were in French hands. The Americans often simply cleared jams by throwing the jammed weapon away and taking up a rifle, especially when the rechambered weapons reached their ranks. The American cartridge was more powerful than the French 8-mm (0.315-in) round and made the gun components break even more rapidly.

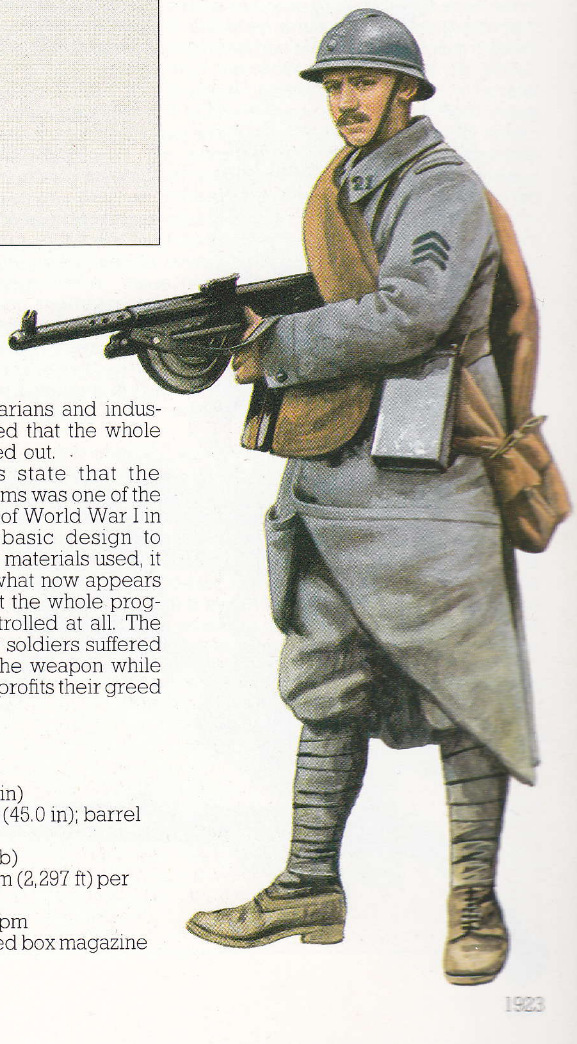
In the end existing production contracts were allowed to run their course, but the resultant weapons were usually stockpiled to be dragged out and later dumped upon unsuspecting post-war markets. In France some parliamentary investigations were made into the Chauchat affair in an attempt to determine exactly how the production contracts were placed and where the profits ended, but by then so many parliamentarians and industrialists were involved that the whole affair gradually fizzled out.

Most references state that the Chauchat in all its forms was one of the worst machine-guns of World War I in all aspects. From basic design to manufacture and the materials used, it was a disaster, but what now appears worse is the fact that the whole programme was not controlled at all. The result was that many soldiers suffered from having to use the weapon while others pocketed the profits their greed had generated.

### Specification
**Chauchat**

**Calibre:** 8 mm (0.315 in)
**Lengths:** gun 1.143 m (45.0 in); barrel 470 mm (18.5 in)
**Weight:** 9.2 kg (20.3 lb)
**Muzzle velocity:** 700 m (2,297 ft) per second
**Rate of fire:** 250-300 rpm
**Feed:** 20-round curved box magazine

*Below: A French soldier fully attired in his* horizon bleu *uniform and greatcoat holds his Chauchat in the prescribed drill book manner for use in the assault.*



# Light Machine-Gun Tactics 1915-1918

*The first machine-guns were not the most mobile of weapons, being emplaced in battle rather like pieces of artillery. It did not take long for the troops on the Western Front to appreciate how effective a machine-gun could be, advancing with them into battle, and so the light machine-gun was born.*

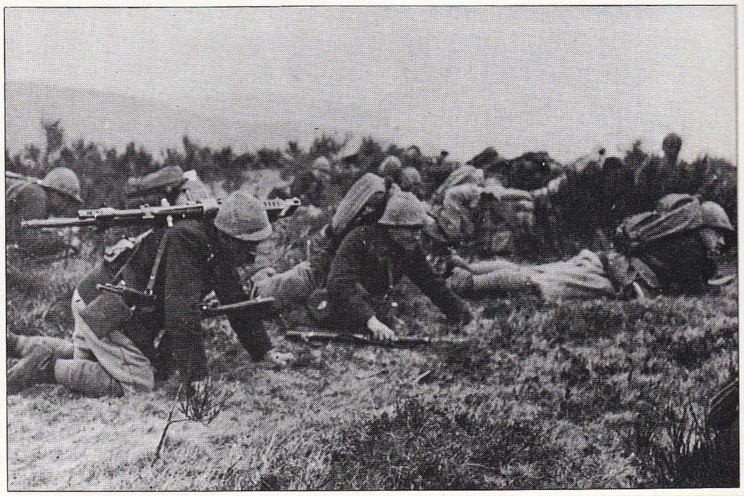
When World War I started the light machine-gun was virtually unknown. Belgian troops did carry into action a number of Lewis Guns, but these were used at that time in exactly the same way as conventional heavy machine-guns, i.e. they were carefully emplaced before an action and used to provide supporting or covering fire. As the troops moved forward into an attack the machine-guns stayed where they were, being considered too heavy to be carried forward.

This was unfortunate, for in the Lewis Gun the Belgians had an excellent infantry weapon that was quite capable of taking on a new role. This new role was indicated during 1915 when the first of the setpiece attacks along the German lines began, with their massive artillery overtures and the subsequent confusion and carnage when the planned infantry attacks stalled either on the barbed wire or in front of emplaced heavy machine-guns. At times like these there was no way in which the infantry could get themselves out of their predicament. Using their rifles alone they could rarely produce enough firepower to make an enemy machine-gunner keep his head down, and there was no way that artillery or machine-gun support could be called upon, for radio was in its infancy and telephone wires were soon cut. For this reason all artillery and machine-gun fire plan support had to be prepared beforehand using rigid fire plans on a timetable basis. If an enemy machine-gun intervened there was no way any supporting fire could be diverted from the fire plan, and the 'poor bloody infantry' thus had to suffer.

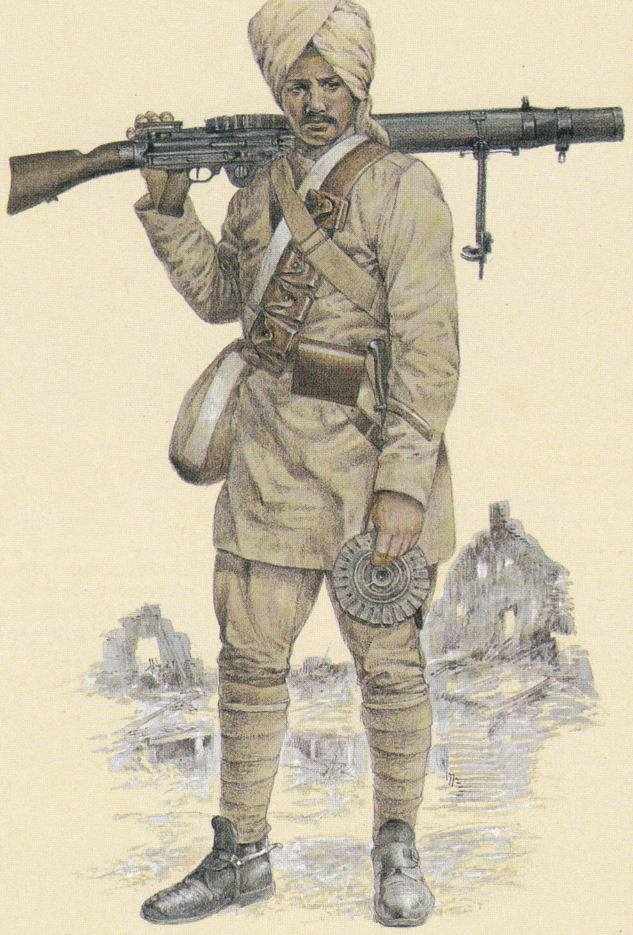
## Fire support

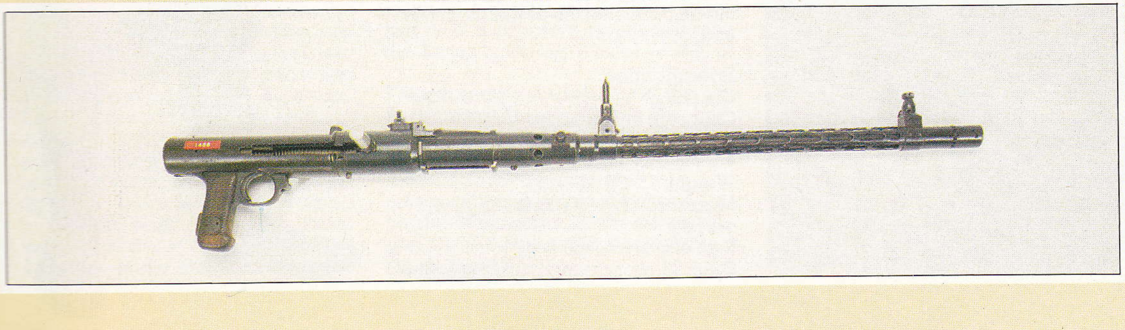
But by the end of 1915 the first inklings of how supporting machine-gun fire could be produced to counter this problem had been suggested by a few forward-looking officers. It was 1916 before their ideas came to the hardware stage: the overall solution to the crossing of no man's land was of course the tank, but an interim solution was found with the service introduction of the Lewis Gun. This had been adopted by the British army for economic rather than tactical reasons: the expanding British armies clearly had to be equipped with machine-guns, and it was found that five or six Lewis Guns could be churned out in the time that it took to produce one of the heavier and more complex Vickers machine-guns. Initially there were four Lewis Guns to a battalion, to replace the Vickers machine-guns that had been passed to the newly-formed Machine Gun Corps. By mid-1916 this allotment had been increased to eight, and a month later a further four were added. By the end of 1916 there was one Lewis Gun to every four platoons, and by the end of the war every two platoons shared one Lewis Gun. By that time there were even four Lewis Guns in every battalion dedicated to the anti-aircraft defence role. This rapid growth in numbers was pushed through by a realization that in the Lewis Gun the long-suffering infantry battalions could have their own local fire support weapons. No longer did the infantry have to rely upon Vickers machine-guns emplaced away to the rear for local fire support. If a target presented itself the Lewis gunners operating right up in the front lines with the first waves of infantry were on the spot to throw themselves down and open fire right away. In this way isolated pockets of resistance left behind by the artillery bombardment could be overcome as quickly as possible. Some units even devised a drill whereby the Lewis Guns were moved forward by two men in the first wave of attackers. One man held the Lewis Gun by looping his arms around the barrel. The other man fired the gun at anything that presented itself. In this manner the gun could be fired without the gunner having to adopt the prone position and fire could also be opened up all the more rapidly.

But these tactics were not universal. Despite the firepower potential of the Lewis Gun, the men that used it were just as vulnerable to enemy fire as the rest, and all too often the Lewis gunners were among the first to be picked off by the carefully-emplaced defenders. In time the infantry tactics changed: they had to, for men were simply not able to walk through a hail of enemy fire to carry out an attack. Instead of proceeding forward in a sedate manner, the infantry instead adopted a method whereby small sections of men rushed forward one after the other. As each section moved forward the other sections provided covering fire over the trench system being attacked. The French adopted this method after suffering from its effects when it was used by the Germans at Verdun in 1916.



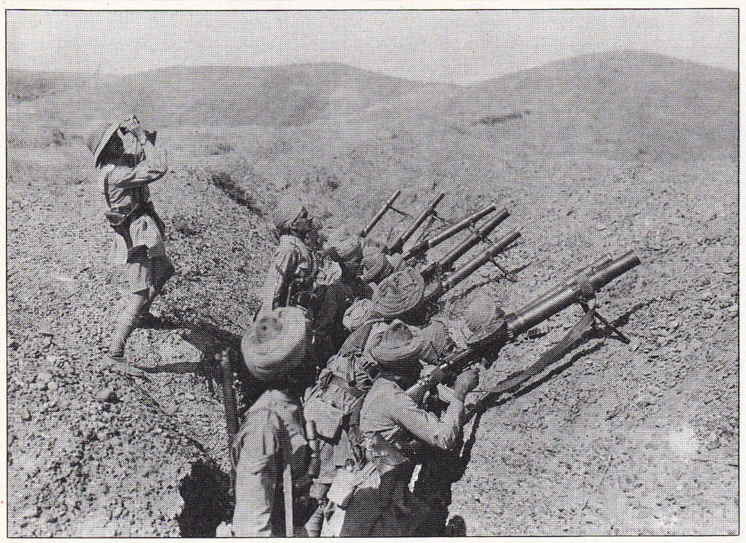
*French infantry operate in the Vosges mountains, with the unfortunate soul in the foreground carrying a Hotchkiss mle 1900 on his back; others would have to carry the tripod and the boxes of ammunition strips. Note that all have rifles or carbines to carry as well while most carry their packs.*



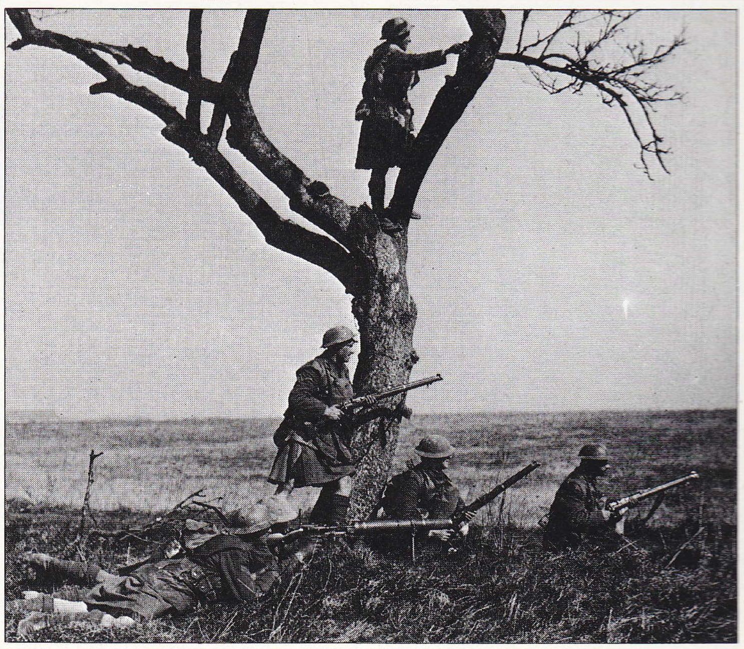


*Above: This Indian cavalryman is seen as he would have been on the Western Front during 1914-5. The Lewis Gun was ideal for use with cavalry as it was relatively light.*

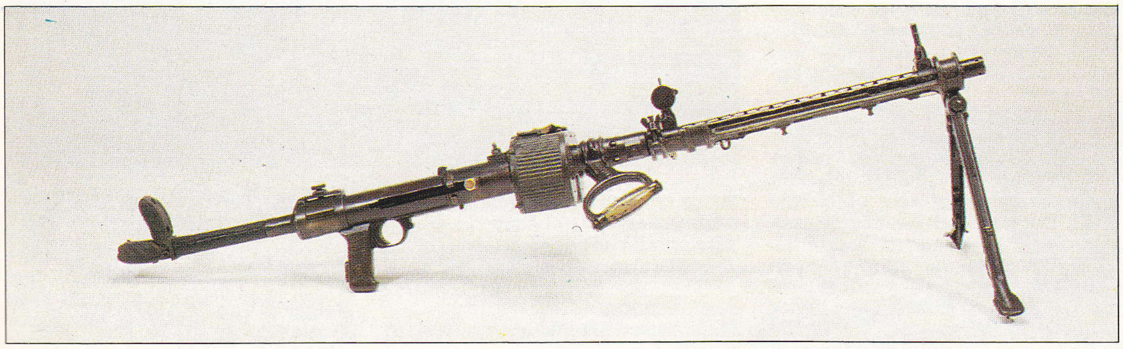
*Left: The German MG 08/15 was an air-cooled machine-gun developed from experience gained during World War I. Designed by Rheinmetall, it had an 'all-in-line' layout and a novel form of locking mechanism.*



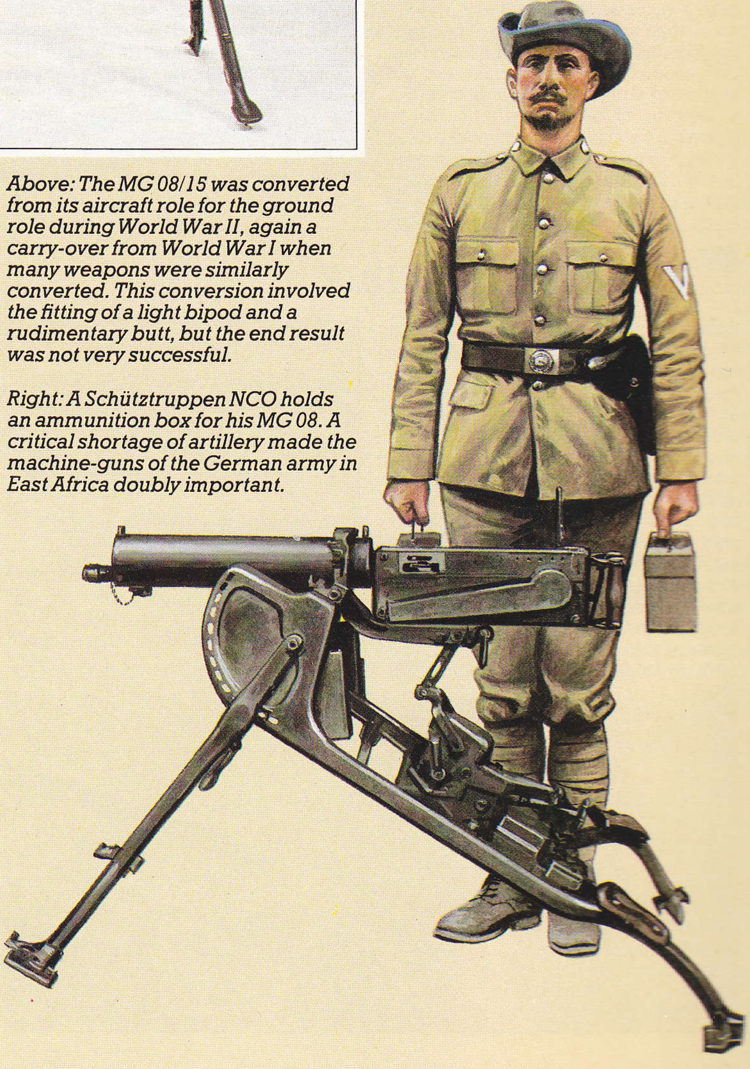
*Above: Any enemy aircraft flying within range of this array of Lewis Guns would have been in for a nasty shock. These Indian Army guns are shown somewhere in Mesopotamia and are fitted with 47-round magazines. Some have slings for ease in carrying their 11.8 kg (26 lb) bulk.*



*Above: A section of the Gordon Highlanders is seen in action during March 1918 near the Somme, with their Lewis Gun being used in the classic supporting fire role. The figure in the tree is probably spotting for targets for the Lewis team and shouting down fire corrections.*



*Above: The MG 08/15 was converted from its aircraft role for the ground role during World War II, again a carry-over from World War I when many weapons were similarly converted. This conversion involved the fitting of a light bipod and a rudimentary butt, but the end result was not very successful.*



*Right: A Schütztruppen NCO holds an ammunition box for his MG 08. A critical shortage of artillery made the machine-guns of the German army in East Africa doubly important.*

The British were reluctant to assume this form of tactics mainly because of the overall poor standard of training they were able to provide for their mass armies, but gradually the soldiers themselves devised methods for the mutual support of sections by other sections. It was here that the Lewis Gun came into its own, for the firepower potential of the weapon was such that a single Lewis Gun could assume the support role of a whole section of riflemen. Thus infantry sections reached the point where a single Lewis Gun team of two men could cover the forward progress of almost an entire platoon.

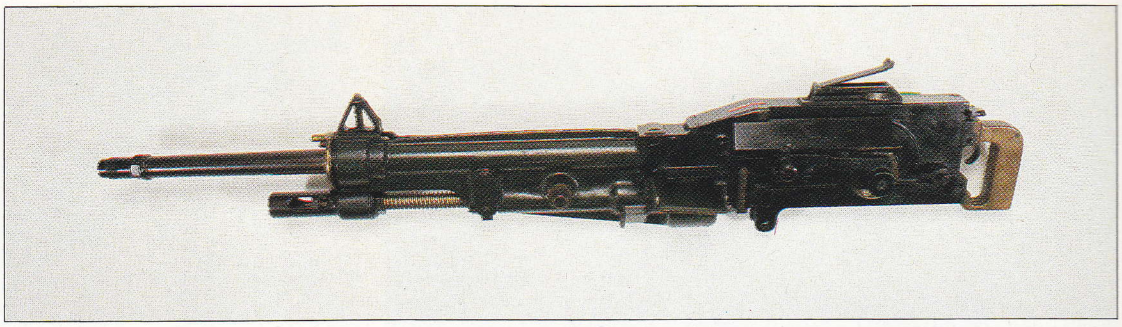
As ever, by this time the Germans were already one stage ahead. They had seen the requirements for a portable machine-gun as early as 1915 and had devised the MG 08/15 Maxim gun for a new array of infantry tactics. Using experience gained on the Eastern Front, the Germans had already designed a new system of infantry warfare employing the same balanced mutual fire support role that had been tentatively evolved by the Allies. However, the Germans took it one stage further. Realizing that infantry alone could not hope to take control of a Western Front trench system, they did not even attempt to take a trench by storm. Instead the German infantry were divided up into small assault teams that were trained simply to pass around any strongpoints they might encounter: so rather than attempting to attack any defensive emplacements that might be in their path, they moved away to the flanks and filtered round into the rear areas. Once there they could disrupt the movement of men and supplies to the forward trenches, attack command posts and generally disrupt the enemy's rear areas. If necessary, troublesome strongpoints could be attacked from the rear.

In this type of combat the light machine-gun had many roles to play. The most important was still that of providing supporting or covering fire while the other sections moved, but the Germans' activities were hampered by a shortage of MG 08/15s. Supply of this weapon could not meet demand, so captured Lewis Guns were pressed into German use. Stretcher bearers became involved in this process of obtaining enemy weapons, some units ordering their stretcher bearers to carry back to the rear as many Lewis Guns as they could find on the battlefield, each one carried on a stretcher along with a casualty.

By 1918 light machine-guns were being used in defence as well as attack. As the German army fell back during the later months of 1918 it worked out a method whereby small light machine-gun teams were used to cover the withdrawal of much larger bodies of men. At times a single MG 08/15 would be used to hold up a whole battalion advancing across open ground, the gun team simply packing up and carrying its gun away to the rear, ready for another holding action, as soon as the Allied assault forces came uncomfortably close to their position.

FRANCE

## Saint-Etienne



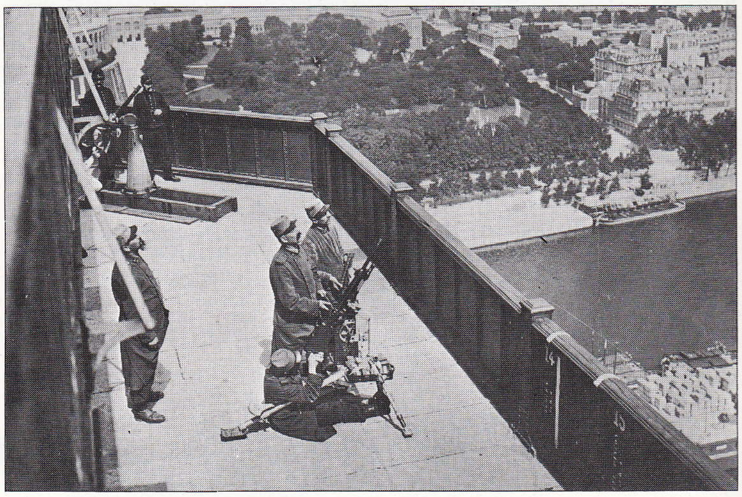
*Above: The French mle 1907 was a state-produced machine-gun intended to improve upon the basic Hotchkiss designs. It was less successful, many being sent to the colonies or relegated to fortress use.*

The Hotchkiss was a commercial design, and the French military authorities wanted to have their own design of machine-gun to match. Unfortunately their efforts were not a success, and indeed were not helped by the fact that the gas-operated mechanism devised by Hotchkiss was protected by a long list of patents that were almost impossible to circumvent. Not deterred, the French, attempted to produce a model known as the **mle 1905** or **Puteaux**. It was so unsuccessful that it was withdrawn from use within two years, the basic design being used for another attempt that was known as the **Mitrailleuse mle 1907** or **Saint-Etienne**, after the arsenal at which it was manufactured.

The French military designers decided to use a gas mechanism based on the Hotchkiss, but to reverse the overall process. Instead of gases in the barrel pushing back a piston, the Saint-Etienne used a system whereby the gases were tapped forward where the piston compressed a spring. The compressed spring was then released to power the rest of the operation. This system worked, but only at the expense of complication and of the use of more pieces that could break or go wrong, so in practice the whole idea was simply not worth the trouble involved. The mle 1907 had an inherent source of ammunition and other jams, and the return spring that was supposed to do all the work got so hot that it either lost its tempering and ceased to operate or else simply broke. In the end the designers could do nothing more than leave the spring exposed to the elements, which aided cooling but also allowed dust and dirt to enter the workings and so produce more jams.

Despite all these inherent troubles, the mle 1907 Saint-Etiennes were used during World War I for the simple reason that the French army became so desperate for weapons that it used anything it could obtain. The tribulations of the mle 1907 simply had to be borne, and as late as 1916 attempts were made to eradicate some of the more obvious faults. None of the modifications was of any use, and gradually the mle 1907s were phased out in favour of the far more reliable Hotchkiss guns. The mle 1907s were shunted off to the French colonies, where they were used to arm local levies and police units. Others were issued to fortress units.

All in all the Saint-Etienne was not a success; indeed, it even carried over the failings from other models. The mle 1905 Puteaux had already indicated the impracticality of some of the mle 1907's features, and the troublesome ammunition feed strip method of the Hotchkiss guns was adopted even when it was known that it should have been phased out in favour of a better method. The result was that in the dreadful conditions of the Western Front trenches the Saint-Etienne often failed.



*A mle 1907 St Etienne machine-gun team poses for a publicity photograph on one of the levels of the Eiffel Tower in an attempt to prove that Paris was able to defend itself against German air raids. The mle 1907 was no more successful in this role than it was in any other.*

### Specification

**Mitrailleuse Saint-Etienne mle 1907**
**Calibre:** 8 mm (0.315 in)
**Lengths:** gun 1.18 m (46.46 in); barrel 710 mm (27.95 in)
**Weight:** 25.4 kg (56.0 lb)
**Muzzle velocity:** 700 m (2,297 ft) per second
**Rate of fire:** 400-600 rpm
**Feed:** 24- or 30-round metal strip

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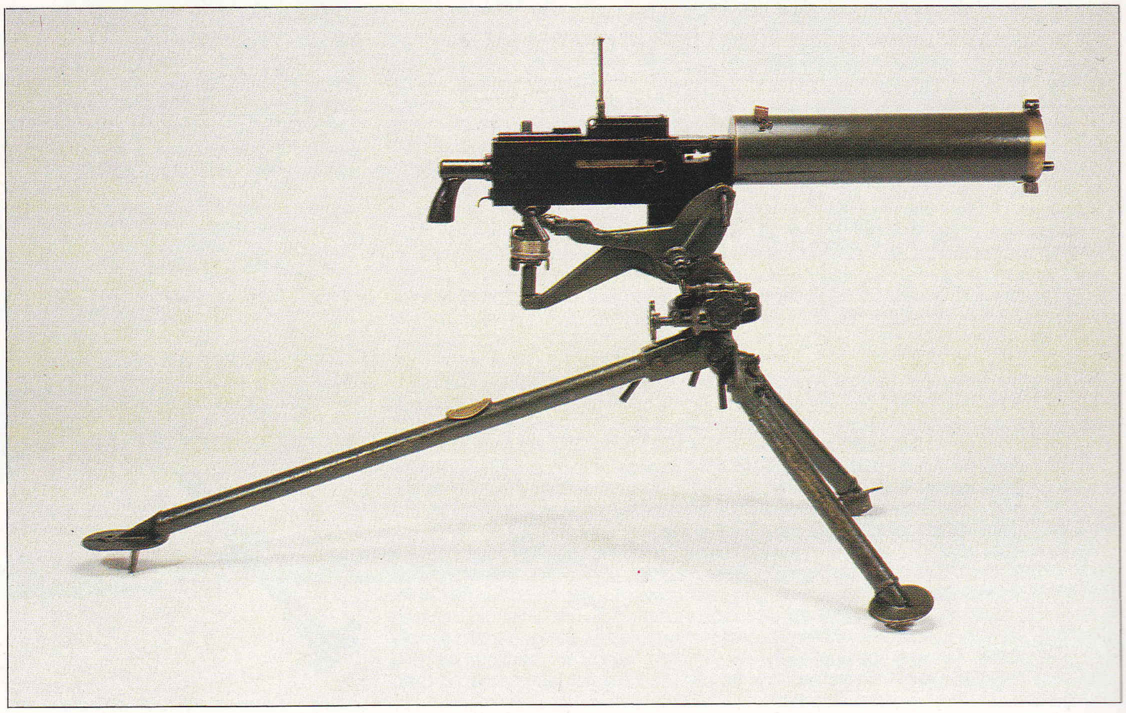
USA

## Browning M1917

Almost as soon as the Colt-Browning Model 1895 was in production, Browning was already at work on a recoil-operated weapon. Unfortunately for Browning, at that time the American military authorities had no interest in any more machine-guns: they considered they had enough already, and anyway funds to purchase more were few. Thus virtually nothing happened until 1917 when the USA found itself at war with few modern weapons and even fewer serviceable machine-guns. In a very short space of time the 'new' Browning machine-gun was ordered into production in large numbers as the **Machine-Gun, Caliber .30, M1917**.

Externally the M1917 resembled other machine-guns of the time, especially the Vickers Gun. In fact the M1917 was quite different: it used a mechanism known as the short recoil system, in which the recoil force produced on firing the cartridge pushes back the barrel and breech block to



*The Colt Model 1917 was the first of many successful Browning-designed machine-guns that are in use to this day. Chambered for the American 0.30-in (7.62-mm) cartridge, they were used by the US Army in France.*

### Browning M1917 (continued)

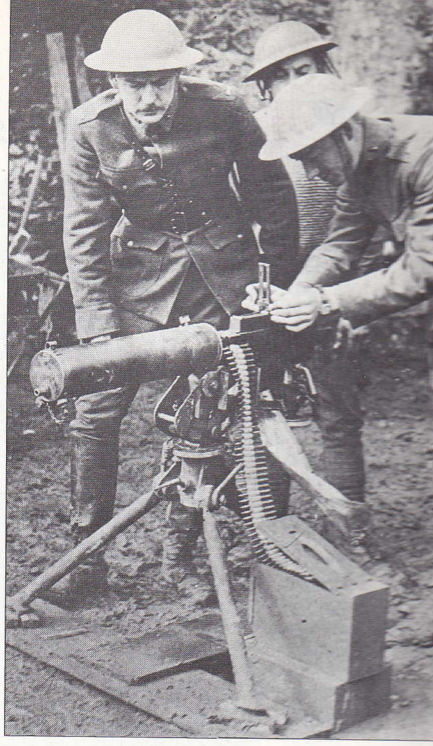
the rear of the gun; after the barrel and bolt have travelled back together for a short distance, the two components part and the barrel movement is halted; a swinging lever known as an accelerator then throws the bolt to the rear, and as it travels a series of cams move the belt feed mechanism to insert another round; a return spring then pushes forward the bolt to the barrel and the whole assembly is then returned for the cycle to start again. This basic mechanism was retained for all future Browning machine-gun designs, from the air-cooled 7.62-mm (0.3-in) to the large 12.7-mm (0.5-in) M2 weapons.

One component that differentiated the M1917 from the Vickers machine-gun (apart from the internal workings) was the firing grip: the Vickers used two spade grips, but the M1917 used a pistol grip and a conventional trigger. Close inspection between the two types will soon reveal many other differences, but the pistol grip is easily noticed.

The M1917 was rushed into production at several manufacturing centres and was churned out in such numbers that by the time the war ended no less than 68,000 had been made. Not all of these reached the troops in France, but after 1918 the M1917 became one of the standard American heavy machine-guns and remained in service until well after World War II. Also after 1918 some slight alterations were introduced as the result of combat experience, but these changes were slight. More drastic changes came after 1918 when the water cooling jacket was removed altogether to produce the **M1919**.

In service the M1917 proved to be relatively trouble free, and despite the rush with which it was placed in service few problems appear to have been recorded. Relatively few M1917s actually reached France before the Armistice, but many were on their way. Those which did arrive were extensively used, for the M1917s were among the few purely-American weapons that were issued to the American troops: up until then all they had from home were their Springfield rifles and a few other sundry items. It was just as well that the M1917 turned out to be an excellent weapon design.

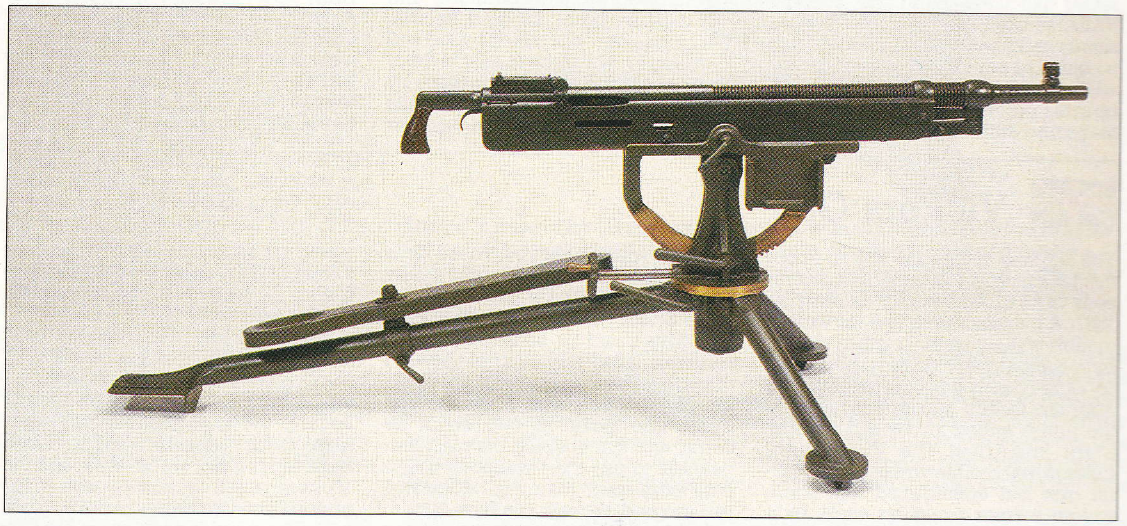
#### Specification
**M1917**
**Calibre:** 7.62 mm (0.3 in)
**Lengths:** gun 0.981 m (38.64 in); barrel 607 mm (23.9 in)
**Weights:** gun less water 14.79 kg (32.6 lb); tripod 24.1 kg (53.15 lb)
**Muzzle velocity:** 853 m (2,800 ft) per second
**Rate of fire:** 450-600 rpm
**Feed:** 250-round belt



***Completely unprepared for a major conflict, the US Army was compelled to rely on Britain and France for much of the equipment for its Expeditionary Force. One honourable exception was the Browning M1917, a fine weapon destined to enjoy a long career.***

USA

## Colt-Browning Model 1895



***The Colt Model 1895 was known to the troops as the 'potato digger' because of the arm that swung down under the body when the gun was firing. This weapon was still in use when the Americans entered the war in 1917 and was used in France.***

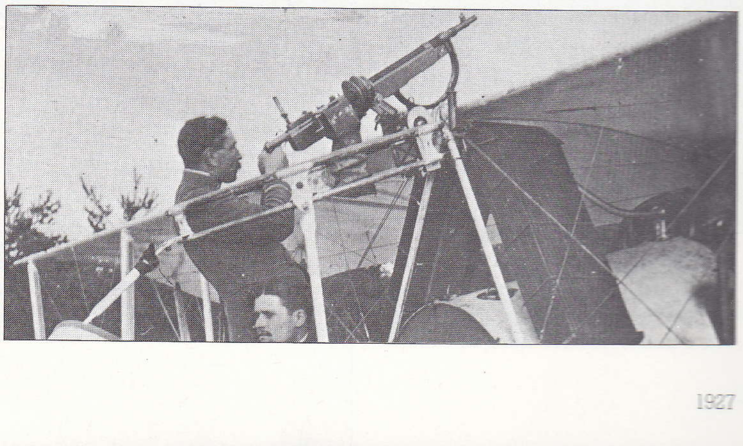
John Moses Browning started design work on a machine-gun as early as 1889, at a time when the American armed forces were still heavily involved with the hand-operated Gatling Gun and when Maxim had already patented his recoil-operated machine-gun. Browning was thus directed towards a gas-operated mechanism, which he gradually refined until it reached the point where the Colt Patent Firearms Manufacturing Company built some prototypes, one of which was demonstrated to the US Navy. It was 1895 before the US Navy decided to purchase a batch chambered for the Krag-Jorgensen 7.62-mm (0.3-in) cartridge, but later this was altered to the .30-06 cartridge that was to remain in use for two world wars.

The **Colt-Browning Model 1895** was a gas-operated weapon that used gases tapped off from the barrel to push down a piston. This in turn pushed down a long lever that swung below the gun body to operate the gun mechanism. It was this lever that gave the weapon the nickname of 'potato digger', for if the gun was mounted close to the ground a small pit had to be dug into which the lever could move, otherwise it would hit the ground and cause stoppages. This drawback was partially offset by the fact that being based on a mechanical operation the movements were very definite and precise, and so able to provide a smooth and trouble-free action. Ammunition was fed into the weapon in 300-round belts.

The Model 1895 first went into action with the US Marine Corps during the Cuban campaign of 1898. The US Army took over a few, and some sales were made to Belgium and Russia. By the time that World War I came around the Model 1895 was already regarded as obsolete, but since by that time the US Army was largely starved of funds to procure more modern weapons the Model 1895s were all that were available and were retained for training. Some did make the journey to France in 1917 and 1918 but few were used in action; instead the Americans took over numbers of French and British machine-guns. The Model 1895 did remain in production for a while during World War I: production was switched to the Marlin-Rockwell Corporation, which modified the weapon by designing out the lever action and replacing it by a more orthodox gas piston system. The result was known as the **Marlin Gun**. It resembled the Model 1895 but was much lighter and was a better weapon overall. Many were produced for the US Army air service as aircraft weapons, and some were produced to become the standard machine-gun for tanks produced in America. In the event the war ended before many of the Marlin Guns could reach the front in sizable numbers, and the bulk of the production run was stockpiled, only to be sold to the United Kingdom for home defence in 1940.

The Belgian and Tsarist Russian armies used the Model 1895 throughout World War I, some of the Russian weapons being prominent during the political upheavals of 1917. A few of the Russian Model 1895s were still being used as late as 1941.

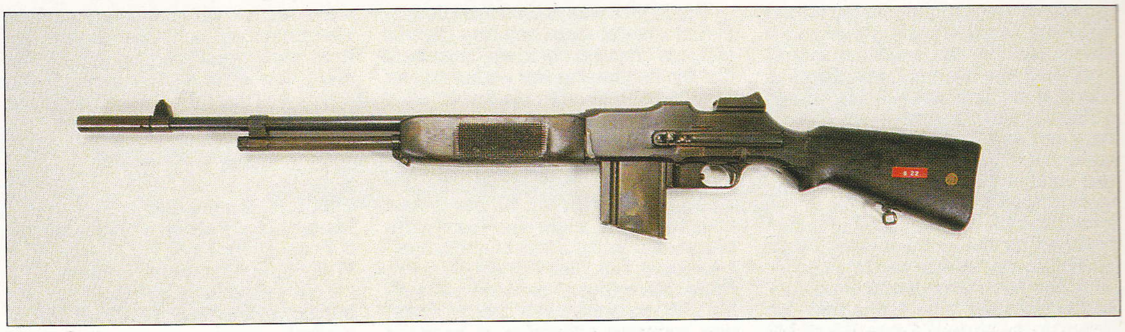
#### Specification
**Colt-Browning Model 1895**
**Calibre:** 7.62 mm (0.3 in)
**Lengths:** gun 1.20 m (47.25 in); barrel 720 mm (28.35 in)
**Weights:** gun 16.78 kg (37 lb); tripod 29.0 kg (64 lb)
**Muzzle velocity:** 838 m (2,750 ft) per second
**Rate of fire:** 400-500 rpm
**Feed:** 300-round belt



***Despite its awkward underbody lever that swung down during firing, the Colt Model 1895 was selected for use as a weapon for early combat aircraft such as this Voisin. This was mainly due to its relatively light weight and air-cooled barrel, though it was not used as such for long.***

USA

## Browning Automatic Rifle



***The Browning Automatic Rifle, or BAR, was a cross between a heavy machine rifle and a light machine-gun. Its magazine held only 20 rounds and there was no bipod on the first models. The US Army found it a very useful weapon and used it in large numbers.***

In 1917 Browning demonstrated two new automatic weapon designs to the Congress in Washington: one was the heavy machine-gun that was to become the M1917, and the other a weapon that is still regarded by many as a hybrid and which became known to all as the **Browning Automatic Rifle**, or **BAR**. The BAR was in an odd category, for to many the weapon was a light machine-gun but to the US Army it was an automatic rifle, in some ways an early assault rifle. It was a light and portable weapon that could fire single shot or automatic, and it could be carried and used by one man.

By early 1918 the BAR was in production at several centres, but as Colt held the Browning patents at that time it produced the drawings and gauges that the other centres were to use. It was September 1918 before the BAR actually reached the stage where it was used in action, but it made a tremendous impact on the American soldiers who soon grew to value the weapon highly, so highly in fact that they were still using the BAR during the Korean War of the 1950s. Exactly why the Americans went so overboard regarding the BAR was (and still is) rather difficult to determine. The first BARs, as used in World War I, were simply hand-held weapons. There was no bipod or any form of support for use when the weapon was fired on automatic in the prone position, and as the box magazine held only 20 rounds the length of bursts was strictly limited. As a light machine-gun the BAR was really too light, and as an automatic rifle it was too large and heavy.

But the American soldiers took to the BAR very well, no doubt as a relief from having to deal with the dreadful Chauchat. Apart from the Springfield rifles, the BAR was one of the first 'all-American' weapons to reach them, and no doubt they wanted to demonstrate the quality of American small arms. The BAR was certainly an impressive-looking weapon. It was excellently made, was provided with well-finished wooden furniture, and was capable of taking hard knocks. The mechanism was gas operated and so arranged that at the instant of firing the mechanism was locked in place by the bolt engaging in a notch in the top of the receiver. This notch was the source of the 'hump' on top of the gun just in front of the rear sights. For maintenance and repairs the BAR could be rapidly and easily stripped down to its 70 component parts and reassembled just as easily.

In the field the US Army devised some combat drills for the BAR. One that did not last long was a drill whereby attacking infantry would fire one shot every time the left foot touched the ground. In fact most of the tactical drills involving the BAR were formulated after 1918, when the lessons of the few months of combat that the US Army had to endure were analysed. Along with the drills the BAR itself changed by the addition of a bipod and a shoulder strap for carrying, and the BAR became more of a section support weapon that could deliver automatic fire in support of riflemen rather than the assault-type weapon role it had been used for in the trenches.

### Specification
**BAR**
**Calibre:** 7.62 mm (0.3 in)
**Lengths:** overall 1.194 m (47 in); barrel 610 mm (24 in)
**Weight:** 7.26 kg (16 lb)
**Muzzle velocity:** 853 m (2,800 ft) per second
**Rate of fire:** (cyclic) 550 rpm
**Feed:** 20-round box magazine

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UK

## Vickers Gun

The UK was among the first to adopt the Maxim gun following demonstrations held in the country as early as 1887. A manufacturing line for various models was set up at Crayford in Kent by a company that came to be known as Vickers' Sons & Maxim Limited, and from this factory Maxim guns went to the British armed forces and to many other countries. The Vickers engineers realized the virtues of the Maxim gun but considered that some weight savings could be made by a redesign, and by careful stress studies much of the mechanism was gradually lightened and the basic action inverted so that the toggle lock invented by Maxim could be made lighter.

The result came to be known as the **Vickers Gun**. In relative terms it was not all that much lighter than a comparable Maxim machine-gun, but the operating principles were much refined making the weapon more efficient. It was approved for British army service in November 1912 as the **Gun, Machine, Vickers, 0.303-in, Mk 1**, and all production initially went to the British Army, where the machine-gun was still regarded with such suspicion that the rate of issue was only two per infantry battalion.

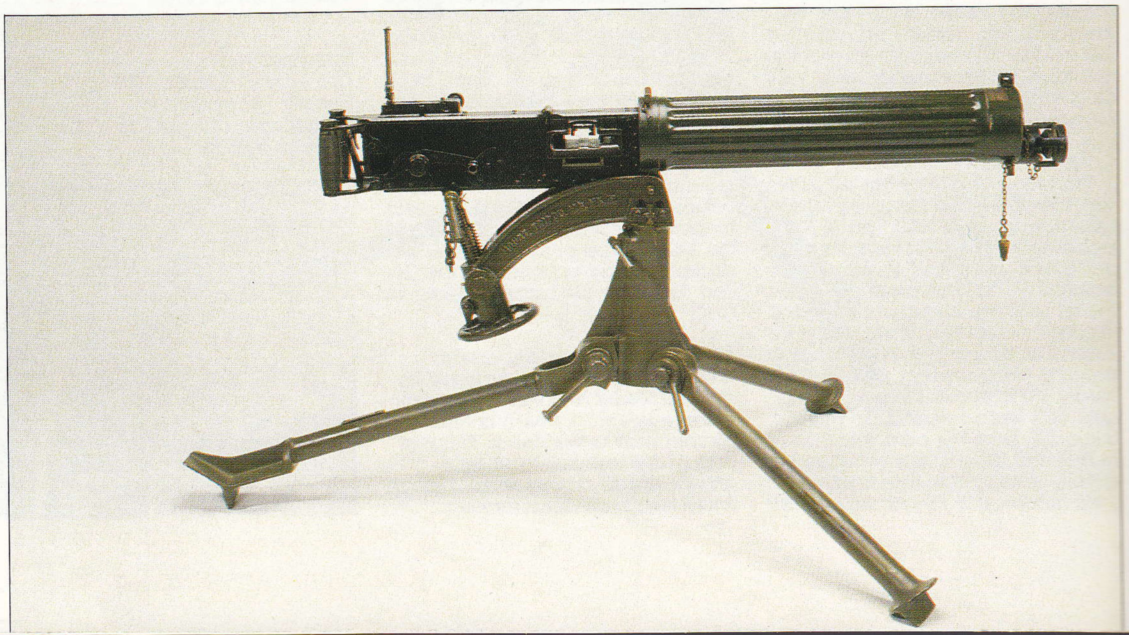
Once World War I started that allotment changed drastically. New production centres were soon opened, some of them located in Royal Ordnance Factories, but the basic design remained unchanged throughout its long production life. The last Vickers machine-gun was very like the first and changes were confined to details. Like most machine-guns of its period, the Vickers was subject to jams, most of them induced by the ammunition, and a series of drills were devised to clear the weapon rapidly. These drills took a bit of learning so in time a new Machine Gun Corps was formed within the British Army so that experience and skills could be confined within a relatively small body and not spread throughout all the regiments of the expanding armies. The Machine Gun Corps also raised its own esprit de corps, and that enabled the machine-gunners to use their weapons with a little extra spirit; their cap badge was two crossed Vickers machine-guns.

In action a Vickers could be kept firing for as long as ammunition could be fed into it. The water in the cooling jacket had to be kept topped up, and after early experiences where steam from the jacket gave way the gun's position a special condenser system (using a hose fed into a water can) was introduced to conceal the steam. After a while the water could be replaced in the jacket.

The Vickers machine-gun was usually mounted on a heavy tripod. Variations on the basic gun included air-cooled versions for use on aircraft, usually on fixed installations only. Many more variations were produced between the two world wars, and the Vickers is still in service with some armed forces to this day; it did not pass from British service until the 1970s. The Vickers machine-gun was, in the opinion of many authorities, one of the best of all the World War I machine-guns, and would still be a very useful weapon today.

### Specification
**Vickers Gun**
**Calibre:** 7.7 mm (0.303 in)
**Lengths:** gun 1.156 m (45.5 in); barrel 721 mm (28.4 in)
**Weights:** gun 18.14 kg (40 lb); tripod 22.0 kg (48.5 lb)
**Muzzle velocity:** 744 m (2,440 ft) per second
**Rate of fire:** 450-500 rpm
**Feed:** 250-round fabric belt

***This Vickers is an American-built version mounted on the British Mk 4B tripod. It was the standard British machine-gun and was even used as the badge of the Machine-Gun Corps, a formation whose very creation underscores the importance of the machine-gun during World War I.***



# The Vickers in Action

*Hiram Maxim produced one of the most successful of early machine-guns, variants equipping many of the armies taking part in World War I. The modified Maxim produced by Vickers, still in service today, became one of the finest machine-guns of the 20th century.*

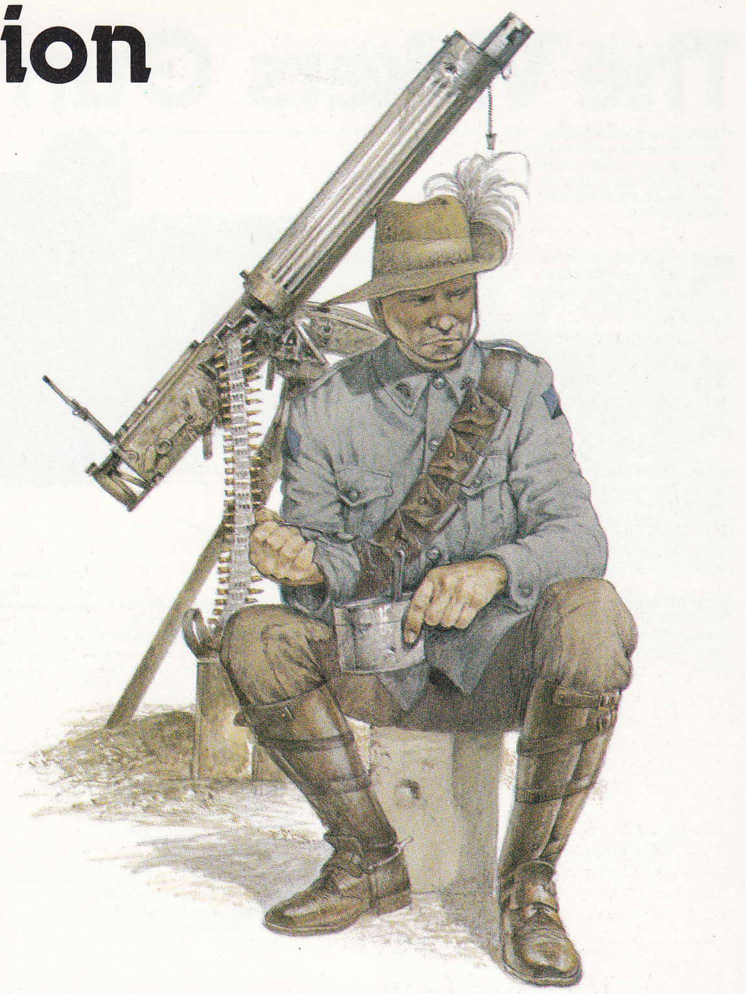
When the first Vickers machine-guns entered service in 1907, few British army officers knew exactly what to do with their new charges. Few appreciated the potential power of the weapon, and those few who did were regarded as eccentrics.

The initial rate of issue of the Vickers machine-gun was two to an infantry battalion; few cavalry battalions took to the weapon and only a few carried them across to France in 1914. Once there they soon learned that the machine-gun was a powerful weapon and the first to suffer were the cavalry units. A single machine-gun hidden away on a distant horizon could keep an entire cavalry battalion immobile for as long as it kept firing. The Battle of Loos further reinforced the lesson for the British, and they began to look at the Vickers weapon in a different light.

The Vickers machine-gun was developed from the earlier Maxim Gun. Vickers had manufactured the Maxim Gun at its Crayford factory in Kent, and although the Maxim had sold very well to many customers, the Vickers design engineers thought that they could improve upon the basic concept to produce a lighter and more efficient weapon. This they did by reversing the Maxim toggle lock device so that it opened upwards instead of downwards. This can perhaps be better explained by going through the sequence of operations involved in the Vickers short recoil mechanism.

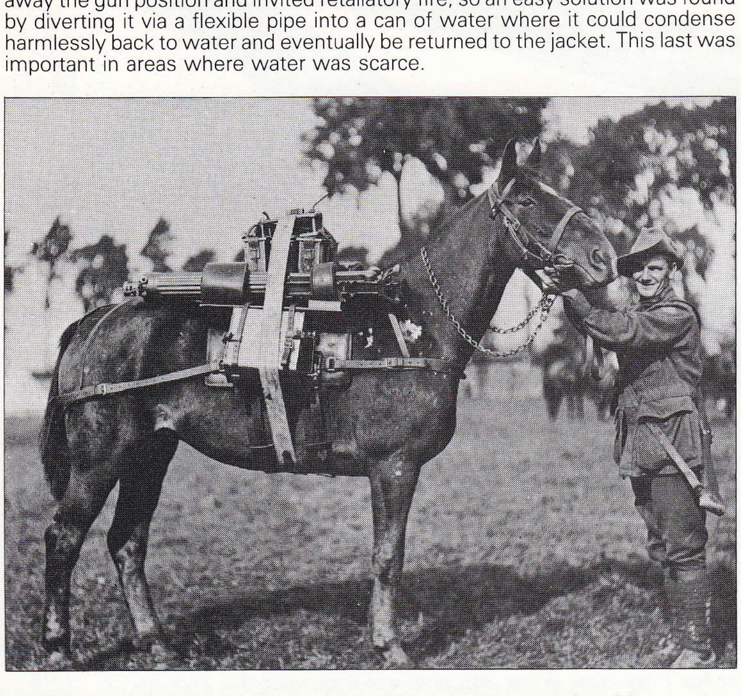
At the moment a cartridge was fired the toggle mechanism, formed from two levers, was in an all-in-line position with the central hinge in line with both levers. This gave the mechanism a very positive and strong lock, for the only way to break the toggle joint was by an upward movement. This was not imparted at the moment of firing, for the recoil forces tended to push the breech block (the lock) backwards in a straight line. As the bullet left the muzzle the gases expanded in a small muzzle chamber and forced back the barrel which in turn provided more impetus for the breech block. Together they moved to the rear, but as they did so the rear of the two toggle levers struck a fixed post, the lever being so arranged that it was then pushed upwards. This broke the positive lock and the breech could then move separately to the rear, taking with it the spent case from the chamber. At the same time the reloading operation could start: as the breech block moved to the rear it placed a load on a spring known as the fuzee spring, which would eventually return the breech block back to the original position. This operation would continue for as long as the trigger in front of the firer's spade grips was pressed.

Prolonged firing made the barrel very hot, so it was cooled by water contained in a metal jacket around the barrel. This jacket held 3.98 litres (7 pints) of water, which would boil after three minutes of sustained fire at the rate of 200 rounds per minute. At first this boiling assisted the cooling process as minute air bubbles helped to carry the heat away from the barrel, but soon the heat caused the water to evaporate as steam. In the early days this was allowed to escape from the top of the jacket, but it was soon noticed that the cloud of steam gave away the gun position and invited retaliatory fire, so an easy solution was found by diverting it via a flexible pipe into a can of water where it could condense harmlessly back to water and eventually be returned to the jacket. This last was important in areas where water was scarce.

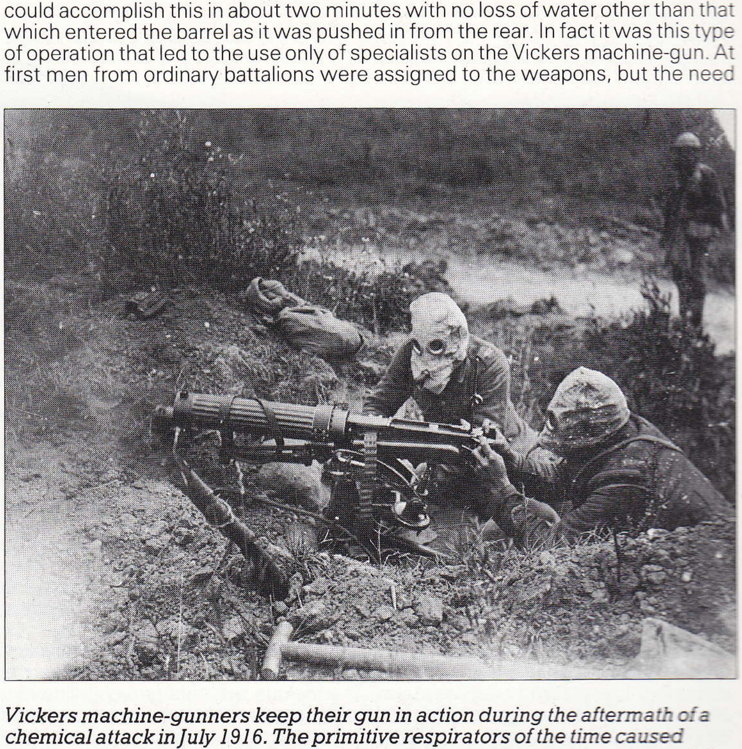


*Seated in front of his Vickers machine-gun, with the tripod reversed to allow the barrel to be elevated for anti-aircraft use, this Anzac soldier is taking a quick break. Using the Vickers in this role could be successful – Australian soldiers claimed responsibility for shooting down von Richtofen's Fokker triplane.*

Despite the water cooling system the barrel had to be changed every 10,000 rounds. As it was possible to fire 10,000 rounds in an hour it often became a drill that in action a barrel was replaced every hour on the hour. A well trained crew could accomplish this in about two minutes with no loss of water other than that which entered the barrel as it was pushed in from the rear. In fact it was this type of operation that led to the use only of specialists on the Vickers machine-gun. At first men from ordinary battalions were assigned to the weapons, but the need

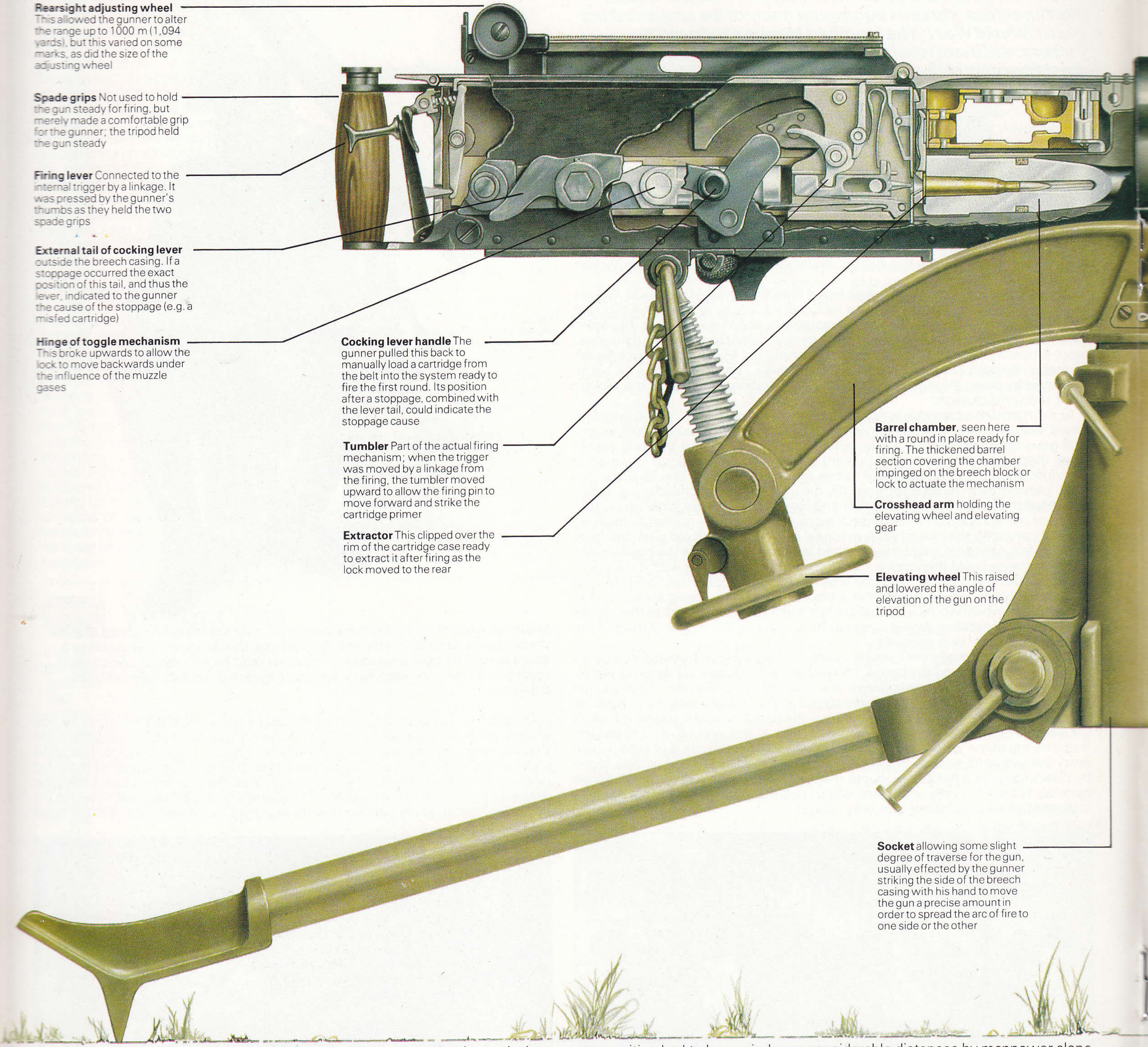


*An Australian soldier demonstrates the drill-book method of packing a Vickers machine-gun onto a packhorse or mule. The special harness carried a complete machine-gun and tripod along with ammunition, water, spares and sighting equipment, even including spare barrels.*



*Vickers machine-gunners keep their gun in action during the aftermath of a chemical attack in July 1916. The primitive respirators of the time caused severe restriction on vision but were just adequate. Note the strap around the barrel that was used for rapid movement in an emergency.*

# The Vickers Gun Mk 1*



**Rearsight adjusting wheel** This allowed the gunner to alter the range up to 1000 m (1,094 yards), but this varied on some marks, as did the size of the adjusting wheel

**Spade grips** Not used to hold the gun steady for firing, but merely made a comfortable grip for the gunner; the tripod held the gun steady

**Firing lever** Connected to the internal trigger by a linkage. It was pressed by the gunner's thumbs as they held the two spade grips

**External tail of cocking lever** outside the breech casing. If a stoppage occurred the exact position of this tail, and thus the lever, indicated to the gunner the cause of the stoppage (e.g. a misfed cartridge)

**Hinge of toggle mechanism** This broke upwards to allow the lock to move backwards under the influence of the muzzle gases

**Cocking lever handle** The gunner pulled this back to manually load a cartridge from the belt into the system ready to fire the first round. Its position after a stoppage, combined with the lever tail, could indicate the stoppage cause

**Tumbler** Part of the actual firing mechanism; when the trigger was moved by a linkage from the firing, the tumbler moved upward to allow the firing pin to move forward and strike the cartridge primer

**Extractor** This clipped over the rim of the cartridge case ready to extract it after firing as the lock moved to the rear

**Barrel chamber,** seen here with a round in place ready for firing. The thickened barrel section covering the chamber impinged on the breech block or lock to actuate the mechanism

**Crosshead arm** holding the elevating wheel and elevating gear

**Elevating wheel** This raised and lowered the angle of elevation of the gun on the tripod

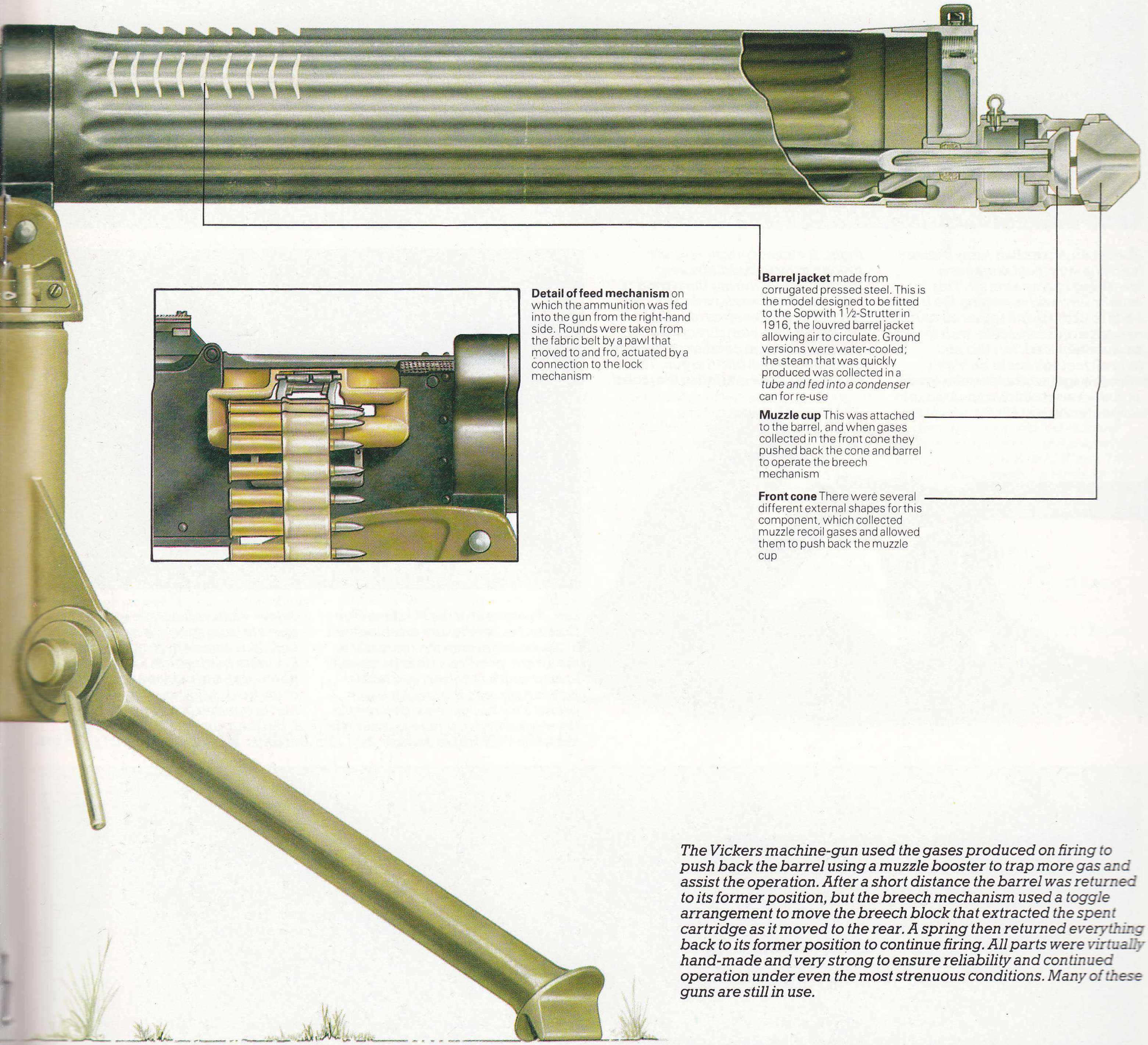
**Socket** allowing some slight degree of traverse for the gun, usually effected by the gunner striking the side of the breech casing with his hand to move the gun a precise amount in order to spread the arc of fire to one side or the other

for experience (not only in the actual servicing of the weapon but its tactical use and resupply over prolonged periods) led to formation of the Machine Gun Corps in October 1915. Gradually the heavy machine-guns assigned to divisions were reallocated as companies of this new corps, and its ultimate importance can be seen in the fact that when World War I ended it contained 6,432 officers and 124,920 other ranks. These men gradually improved the art of using machine-guns in battle by formulating procedures whereby they were fired not in isolation but as part of a mutually-supporting fire plan. Steadily they improved these fire plans so that at times the machine-gun fire plans resembled those of the artillery. Indeed, on occasions machine-guns were used to harass the enemy in much the same way as artillery.

However, it was soon discovered that if machine-guns were given the task of providing prolonged fire support, they required not only highly trained crews but also a highly organized supply system. The Vickers machine-gun could devour ammunition at a prodigious rate, and considerable ammunition supplies had therefore to be kept in the supply line at all times. One snag soon encountered was that of transport: there were few places in the front lines of 1914-8 where supply vehicles could get anywhere close to the forward trenches, so the ammunition had to be carried over considerable distances by manpower alone. Once on site the ammunition could not be simply loaded into the gun. The rounds were supplied in metal cases that often held the ammunition in the form of small cardboard cartons each containing 100 rounds, as being intended for use by many types of weapon (Lee-Enfield rifles, Lewis Guns and so on) and it was not possible to provide the rounds already loaded into their fabric belts, and this had to be done before they could be fed into the gun. This was often done by hand, which was a time-consuming process, though later a special loading machine was devised and issued.

So there was more to using the Vickers machine-gun in action than simply pressing a trigger and watching the enemy tumble. In time the members of the Machine Gun Corps became every bit as proficient as their German counterparts when it came to using machine-guns in action, and were sometimes much more imaginative in the tactical use of their weapons.

An example of this can be found in the instance when 10 Vickers machine-guns of the 100th Machine Gun Company played their part in the battle to secure High Wood on 24 August 1916, as part of the battle now known as the Battle of the Somme. This was a dour slogging match that lasted months under the most



**Detail of feed mechanism** on which the ammunition was fed into the gun from the right-hand side. Rounds were taken from the fabric belt by a pawl that moved to and fro, actuated by a connection to the lock mechanism

**Barrel jacket** made from corrugated pressed steel. This is the model designed to be fitted to the Sopwith 1½-Strutter in 1916, the louvred barrel jacket allowing air to circulate. Ground versions were water-cooled; the steam that was quickly produced was collected in a tube and fed into a condenser can for re-use

**Muzzle cup** This was attached to the barrel, and when gases collected in the front cone they pushed back the cone and barrel to operate the breech mechanism

**Front cone** There were several different external shapes for this component, which collected muzzle recoil gases and allowed them to push back the muzzle cup

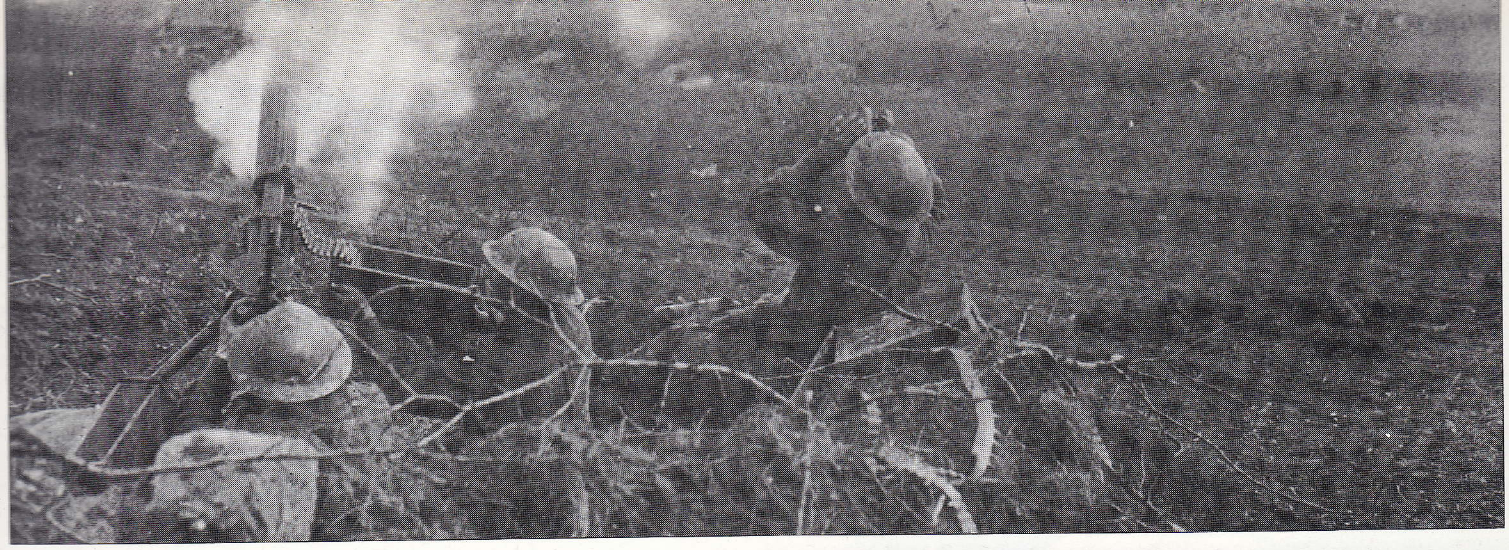
*The Vickers machine-gun used the gases produced on firing to push back the barrel using a muzzle booster to trap more gas and assist the operation. After a short distance the barrel was returned to its former position, but the breech mechanism used a toggle arrangement to move the breech block that extracted the spent cartridge as it moved to the rear. A spring then returned everything back to its former position to continue firing. All parts were virtually hand-made and very strong to ensure reliability and continued operation under even the most strenuous conditions. Many of these guns are still in use.*

dreadful conditions, with the British attacking most of the time. After an attack in the High Wood area it was noted that an earthwork known as Savoy Trench offered a good fire position that commanded the German front line about 1830 m (2,000 yards) distant. It was decided that the next foray on the German front line would be supported by the machine-guns of the 100th Company; once this had been completed the inevitable German counterattack would be halted by keeping the area behind the front-line trenches covered by machine-gun fire lasting 12 hours.

Such a formidable fire plan called for considerable preparation. The night before the attack two infantry companies were needed to move forward the ammunition and the water for the guns. The guns were carefully emplaced and camouflaged under netting and made ready for the battle ahead.

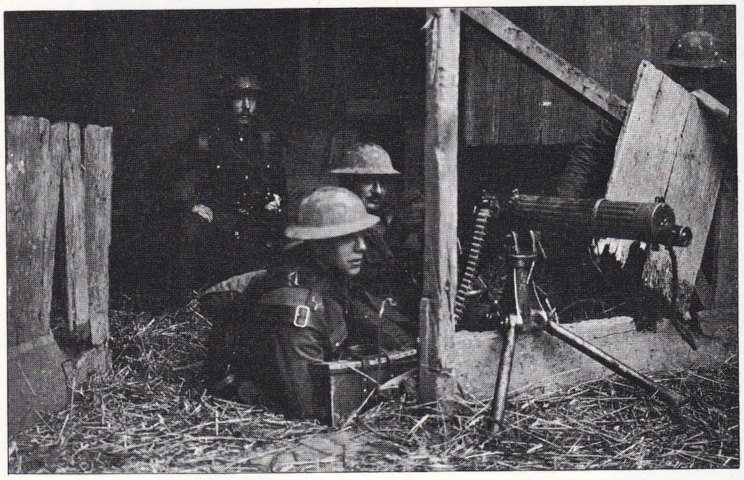
As the attack went in the machine-guns opened fire and kept firing for the next 12 hours. At intervals the gunners were changed, along with the faithful ammunition numbers who were responsible for guiding the ammunition belts into the gun to prevent them from twisting or dragging along the ground and so picking up dirt. The firer had little to do other than keep down the trigger between the two spade grips; he could feel little of the firing recoil, which was mostly absorbed by the heavy tripod. From time to time he gave the side of the gun a sharp tap to move the barrel slightly to cover a wider area and a few moments later another tap would move the barrel again.

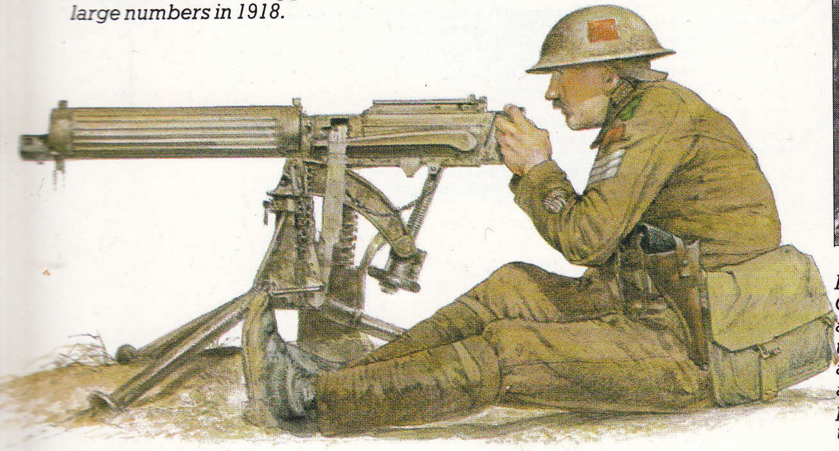
When necessary the water in the cooling jackets was topped up with some of that so carefully stockpiled during the previous night. Barrels were changed every hour. All through the 12-hour period a party of men was kept busy moving ammunition from the dump built the previous night to two men who kept a loading machine in constant action. From the loading machine another party took the full belts to the guns. By the time the action ended the 10 guns had managed to fire just 250 less than one million rounds. Throughout that period only two guns gave any trouble, one with a broken extractor pawl and another that had something wrong with its lock mechanism and so suffered random jams. All the stockpiled water had been consumed, and the guns had only been kept going by use of the company water bottles and the crews' personal resources. But in the end it all worked. The enemy front-line trenches had been taken and the anticipated counterattack had not taken place, for the simple reason that no German soldier could cross the area of ground beaten by the fire of the 10 Vickers machine-guns of the 100th Machine Gun Company.



*Above: An Australian Army Vickers machine-gun team engages a low-flying enemy aircraft. This usually involved reversing the tripod head to provide the required barrel elevation and some care with the ammunition feed, but this anti-aircraft method could be highly effective against the German ground attack aircraft which appeared in large numbers in 1918.*

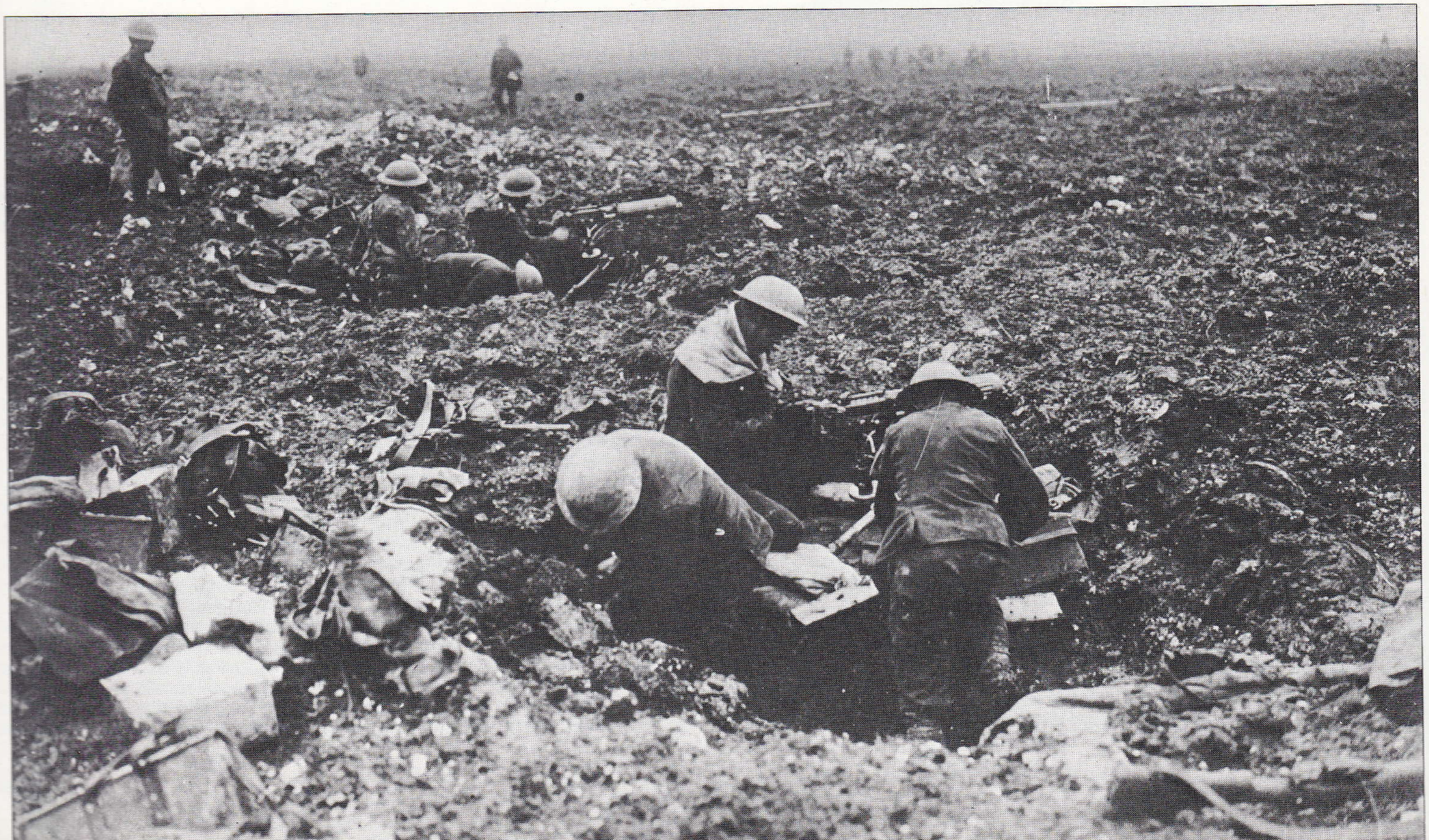
*Right: A Vickers machine-gun is hidden in farm buildings near Haverskerque during the period of relatively fluid warfare that followed the German offensives of early 1918. As always, one man directs the gunner's fire and another guides the ammunition belt into the gun. The condenser hose is fitted to the jacket.*





*Left: A sergeant of the Machine Gun Corps uses his Vickers machine-gun at close range (note the rearsight in the 'down' position). He is personally armed with a revolver, and on his arm can be seen the machine-gun proficiency badge, awarded only to the most skilful machine-gunner who knew the Vickers backwards.*

*Below: Vickers machine-gun teams operate from specially-prepared positions somewhere among the Flanders battlefields. This photograph provides an indication of the field conditions the Vickers had to operate in during World War I, but the guns could absorb all manner of hard and mud-infested use.*



DENMARK

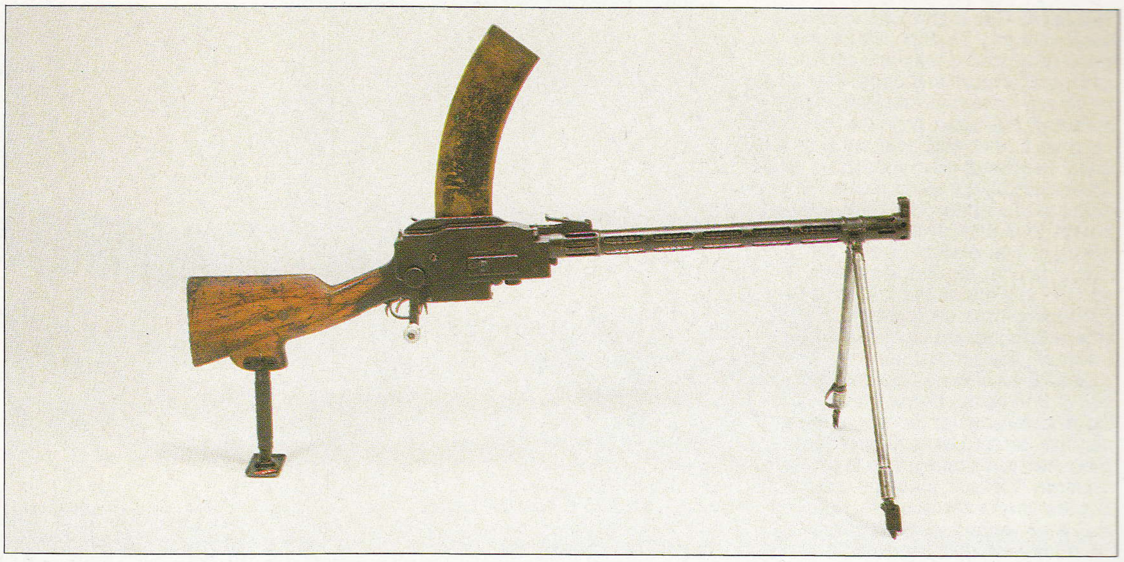
# Madsen machine-guns

The first Madsen machine-gun was produced in Denmark by the Dansk Industri Syndikat in 1904 and the last in 1950. The Madsen series was really a long string of near-identical models produced in a very wide array of calibres to suit the requirements of many export customers all around the world.

Although it was not fully realized at the time that the first were produced, the **Madsen 8-mm Rekytgevaer M1903** machine-gun was one of the very first of the light machine-guns, and even featured the world's first overhead box magazine of its type. The weapon used a unique operating principle that has been used in no other design and which even for its time was expensive, complex and difficult to manufacture. This was a system that used the Peabody-Martini hinged block action, an action familiar on small-calibre match rifles. What Madsen did was to convert this essentially manually-operated action to a fully automatic. By using a combination of the recoil plus the movement of a plate moving on cams and levers, the action opened and closed the hinged block, but as this block had no integral bolt action (as with a normal breech block) a separate rammer and extractor mechanism had to be used. It sounds and was complicated, but the system had one major attribute and that was that it worked very reliably under a wide range of conditions and with all sorts of ammunition, although rimmed ammunition such as the British 7.7 mm (0.303 in) was not so successful.

As well as being produced in many calibres for customers as far away as Thailand, the Madsen was also manufactured in a wide variety of forms. Having an air-cooled barrel the Madsen was not ideally suited for the sustained-fire role, but various types of heavy tripod were produced. The more usual mounting was a bipod secured just under the muzzle though some models, including those for the Danish armed forces, had a short pedestal under the barrel for resting the barrel on parapets in houses or fortifications. A carrying handle was often fitted. One feature that promoted the Madsen's reliability was the type's excellent manufacture using the best materials available, which no doubt added to the overall costs.

During World War I the Madsen was not an official weapon used by any of the major protagonists, but all the same many Madsens appeared in nearly every continental army. The Madsen was one of the first weapons used by both sides for early experiments in aircraft armament, although it was soon passed over in favour of other weapons. It was also used in small numbers by German troops experimenting on the Eastern Front with their *Sturmtruppen* tactics, and more were used by some of the Central European armies, again in small numbers only. When the light machine-gun concept became more widely accepted the Madsen was investigated by many nations, and the British even attempted to use it in 7.7-mm calibre. Unfortunately this cartridge was rimmed and it was one that did not work well in the Madsen mechanism; the guns were thus put by only to be issued again in 1940, this time to the new Home Guard.



*The Madsen machine-gun was one of the first light machine-guns, and used a complex falling block locking system. It was produced in many calibres and models and was widely used throughout World War I. This version was used for a while by the British Army chambered for 0.303-in (7.7-mm) ammunition.*

## Specification

**Rekytgevaer M1903**  
**Calibre:** 8 mm (0.315 in)  
**Lengths:** overall 1.145 m (45.0.8 in); barrel 596 mm (23.46 in)  
**Weight:** 10 kg (22.05 lb)  
**Muzzle velocity:** 825 m (2,707 ft) per second  
**Rate of fire:** (cyclic) 450 rpm  
**Feed:** 20-round box magazine

RUSSIA

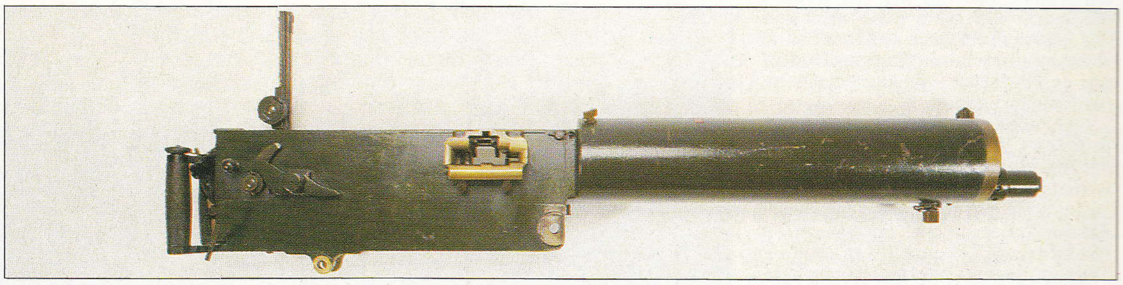
# Pulemet Maksima obrazets 1910

The first Maxim machine-guns for Russian service were ordered direct from Vickers in the early 1900s, but it was not long before the Russians were producing their own models at the state arsenal at Tula. The first 'Russian' model was the **Pulemet Maksima obrazets 1905** (Maxim gun model 1905), which was a direct copy of the original Maxim gun but produced with a typical Russian flourish in the bronze water jacket. In 1910 this bronze jacket was replaced by a sheet steel jacket and this was known either as the **obr 1910** or the **PM1910**.

The PM1910 was destined to be the longest-produced version of all the many Maxim gun variants, for it remained in full-scale production until 1943. Although there were several variants over the years, the basic PM1910 was a solid piece of equipment that served very well under even the most drastic conditions and all extremes of climate, a fact which suited the Russians very well considering their far-flung empire. This reliability had to be purchased at a cost, and that cost was weight. The PM1910 and anything to do with it was very heavy, so heavy in fact that the usual carriage resembled a small artillery field carriage. On this carriage, known as the Sokolov mounting, the gun was usually protected by a removable shield. The gun rested on a large turntable for traversing and was elevated by a large wheel-operated screw. The turntable was carried on two spoked steel wheels and the whole arrangement could be towed by hand using a U-shaped handle. On many of these early Sokolov mounts there were two side legs that could be extended forward to raise the entire weapon and carriage for firing over parapets; on later models these legs were omitted.

The weight of the PM1910 complete with the mounting was no less than 74 kg (163.1 lb). This meant that at least two men were required to drag the weapon (more across rough ground, for which drag ropes were provided). A special sledge mounting was available for use during the winter months, and the weapon could also be carried on the widely-available peasant carts used all over Russia. To offset this weight penalty, the PM1910 could be kept firing for as long as belts were fed into the mechanism. It required next to no maintenance, which was just as well for the state of training in the Tsarist armies usually meant that no servicing (other than rudimentary cleaning) was provided.

PM1910s were produced in vast numbers until 1917, by which time production had spread to centres other than Tula. The only change made during World War I was that the original smooth water-cooling jackets were replaced by corrugated jackets to increase the surface area slightly and thus increase cooling. At times the heavy shields were left off to decrease the weight slightly. During World War I the amount of rough handling the PM1910 could absorb became legendary, so much so that the Germans used as many as they could capture, though only on the Eastern Front.

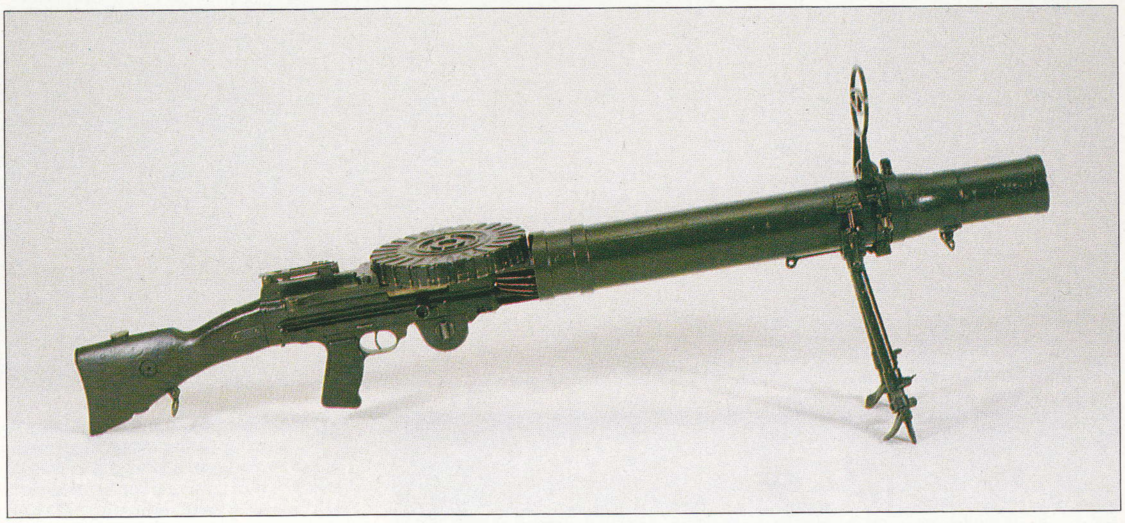


*Originally built by Vickers for the Russian army, the Maxim gun was soon being manufactured in the Imperial Arsenal at Tula, outside Moscow. It was to remain in quantity production until 1943.*

## Specification

**PM1910**  
**Calibre:** 7.62 mm (0.3 in)  
**Lengths:** overall 1.107 m (43.58 in); barrel 720 mm (28.35 in)  
**Weights:** gun 23.8 kg (52.47 lb); mounting with shield 45.2 kg (99.65 lb)  
**Muzzle velocity:** 863 m (2,831 ft) per second  
**Rate of fire:** (cyclic) 520-600 rpm  
**Feed:** 250-round fabric belt

# Lewis Gun



*Above: The Lewis Gun was widely used by the British Army but it was originally produced in Belgium. It was easily recognizable from its bulky air-cooling jacket and the flat pan magazine, here holding 47 rounds.*

The **Lewis Gun** is put into an international category for although its origins were American it was first produced and manufactured in Europe. Its inventor was an American, one Samuel Maclean, but the basic concept was developed further and 'sold' by Colonel Isaac Lewis, another American. The American military authorities were unenthusiastic about the new gun, so Lewis took the design to Belgium where it was accepted and put into production for the Belgian army. That was in 1913, and in the following year production was switched to the UK where Birmingham Small Arms (BSA) took over the programme.

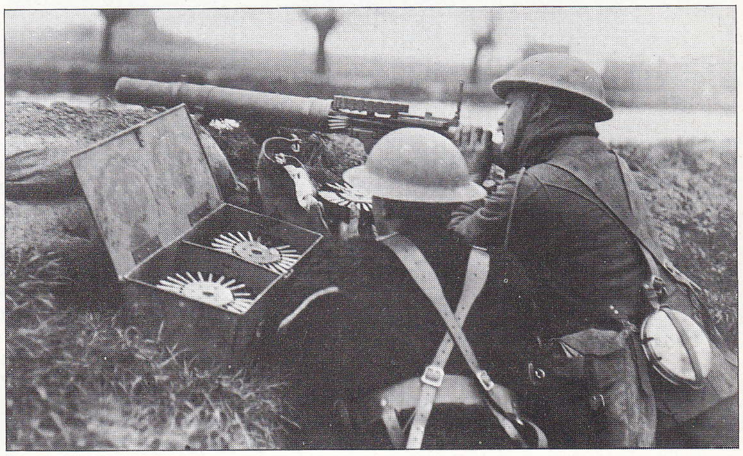
The Lewis Gun was put into production at BSA as the **Lewis Gun Mk 1** for the British Army for the simple reason that five or six Lewis Guns could be produced in the time it took to produce a single Vickers machine-gun. The fact that the Lewis was light and portable was secondary at that time, but once in service the Lewis proved to be a very popular front-line weapon with a host of mobile tactical uses. The Lewis Gun was one of the first of the true light machine-guns and with its distinctive overhead drum magazine it was soon a common sight on the Western Front. The Lewis Gun was a gas-operated weapon, gas being tapped off from the barrel on firing to push a piston to the rear; the piston pushed back the breech block and mechanism and also wound up a coil spring under the gun which was used to return everything to the start position. The mechanism was rather complex and took careful maintenance, but even then was still prone to an alarming number of jams and stoppages, some of them introduced by the overhead drum magazine, which was a constant cause of trouble especially when only slightly damaged. The barrel was enclosed in a special air cooling jacket that was supposed to use a forced draught system of cooling, but experience showed that the jacket's efficiency had been over-rated and the gun worked quite well without it. Versions of the Lewis Gun intended for use on aircraft did not have this complex cooling jacket.

Only after the Lewis Gun had been produced in thousands in Europe did the American military authorities finally realize the potential of the weapon, and it went into production for the US Army (and air corps) chambered in the American 7.62-mm (0.3-in) calibre. Thus the Lewis Gun became truly international, especially as the Germans were in the habit of using as many captured examples as they could to bolster their own machine-gun totals. Some Lewis Guns were used on the early tanks and more were used by naval vessels. A similar role cropped up again in World War II when stockpiled Lewis Guns were distributed for the defence of merchant shipping and for Home Defence in the hands of the Home Guard and Royal Air Force airfield defence units.

The Lewis Gun was a complex weapon, but in service it made quite an impression in a way that was not possible using the heavy machine-guns. The Lewis Gun was the first of the true light machine-guns in more ways than one.

## Specification

**Lewis Gun Mk 1**
**Calibre:** 7.7 mm (0.303 in)
**Lengths:** gun 1.25 m (49.2 in); barrel 661 mm (26.02 in)
**Weights:** 12.25 kg (27 lb)
**Muzzle velocity:** 744 m (2,441 ft) per second
**Rate of fire:** 450-500 rpm
**Feed:** 47- or 97-round overhead drum magazine

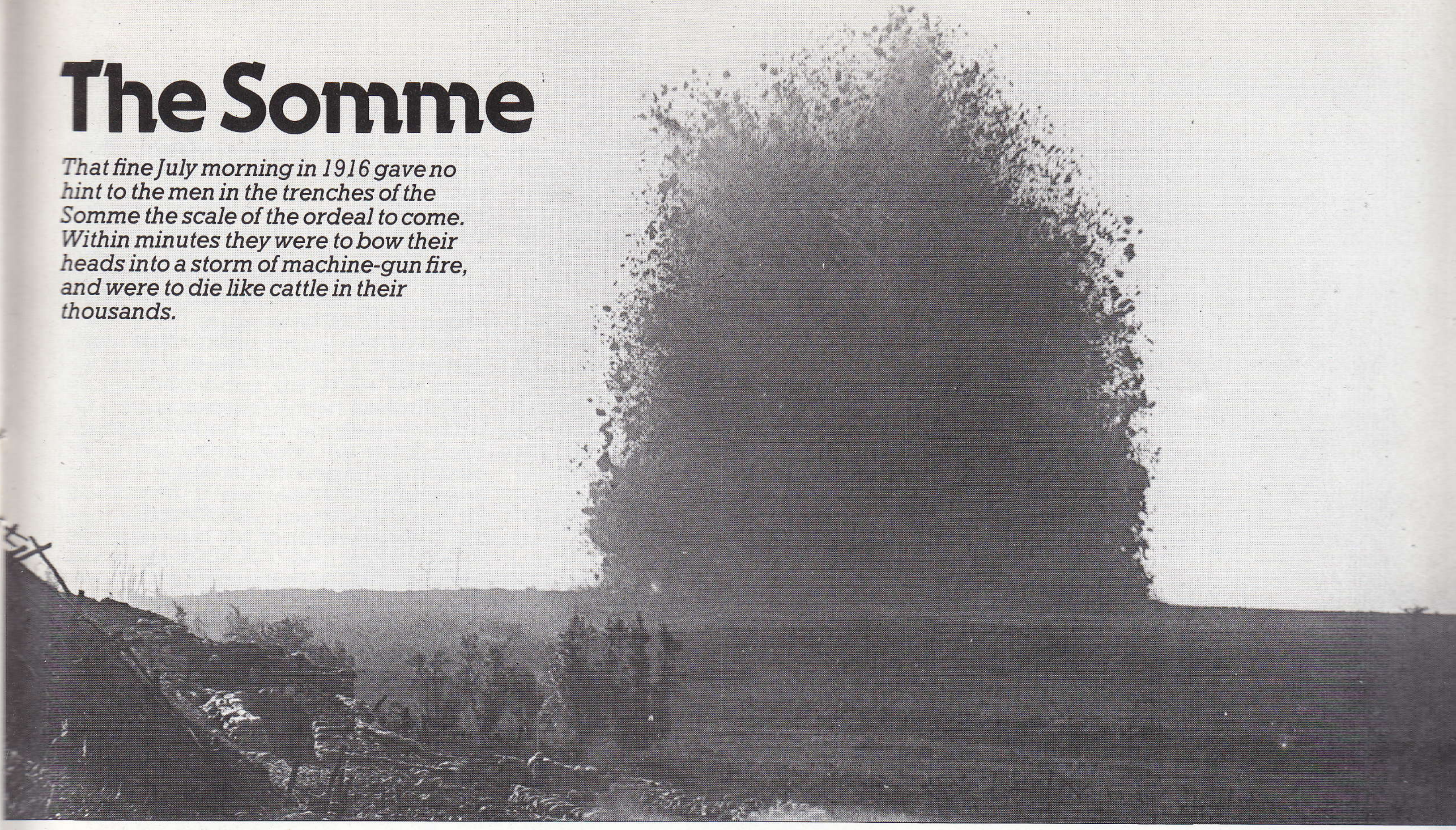


*A British Lewis Gun team in action shows the ready-filled ammunition pans still in their box. The fins of the air-cooling jacket can be seen under the ammunition pan on the gun; these fins were supposed to force air along the barrel, but were superfluous.*

*A British Army Lewis gunner firing his Lewis Gun as if it were a rifle, no doubt at some hastily-presented target. Firing the Lewis Gun in this fashion was usually inaccurate, for the weight of the gun was too high for prolonged firing and the recoil soon shook the aim off the target.*

# The Somme

*That fine July morning in 1916 gave no hint to the men in the trenches of the Somme the scale of the ordeal to come. Within minutes they were to bow their heads into a storm of machine-gun fire, and were to die like cattle in their thousands.*



***The mine explodes under the Hawthorn Redoubt 10 minutes before the attack on Beaumont Hamel. This mine heralded the Battle of the Somme and removed one of the major German strongpoints in the path of the planned British advance. It was one of a series of mines exploded along the German lines.***

No battle in World War I was as shaped by the machine-gun as the British 1916 summer offensive, the Battle of the Somme. The impact of the German MG08 'Spandau' and Bergmann guns has remained long after the 'day of breathtaking summer beauty', as Siegfried Sassoon described 1 July 1916, the opening day of the Battle of the Somme. The image of the skirmish lines of khaki infantry, Lee Enfields at the high port position, cut down in the barbed wire has shaped not only the West's perception of modern war, but of modern life itself. More than infantrymen fell to the machine-guns on the Somme. The structured, progressive pre-1914 world died there as well.

The heavy losses inflicted on attacking troops by German machine-guns at Neuve Chapelle and Loos in 1915 shaped the British plan for the Somme. The lesson that the British drew from those battles was that they had to use their artillery to deliver even more tons of high explosive onto the machine-guns before the infantry assault was committed. Enough shells, it was reasoned, would result in no more machine-guns.

## Dugout survival

The British preliminary barrage was supposed to defeat the machine-guns. The infantry would then, according to plan, simply occupy the ground. But despite the length of the British barrage, the German machine-guns on the Somme showed that firepower cannot win a battle by itself. The front-line machine-guns survived the barrage in their deep dugouts. This lesson of the machine-guns on the Somme was relearned by the US Marines on Tarawa in 1943 and countless times during the Vietnam War. Massive firepower (even the seven-day barrage that preceded the opening of the Somme) will not defeat an entrenched defender by itself. Later in the war the barrage became the short, tremendously intense 'hurricane', often using extensive gas for suppression. The barrage before 1 July also suffered from a high dud rate and a lack of heavy guns that could penetrate the deep bunkers where the German machine-guns and machine-gunners were waiting until the 10-minute period, just before 07.00, between the moment the barrage lifted and the whistles blew for the British infantry to go over the top.

The 1915 battles showed that a single machine-gun could defeat an attacking battalion if allowed to fire unsuppressed. On 1 July 1916 battalion after battalion found that the power of the machine-gun had not been overestimated. For example, the 7th Battalion, Green Howards and the 10th Battalion, West Yorkshire Regiment attacking the village-fort of Fricourt (the German defence was based around these village-forts, connected by trenches) were both cut up within three minutes by a single machine-gun. The 16th Battalion, Northumberland Fusiliers attacked towards Thiepval with great bravery, dribbling a football across no man's land. There were four machine-guns opposite the battalion, and only 11 men from the assault companies walked back. The story was repeated throughout the day up and down the British front. The casualties (57,470 men, of whom 19,240 were killed or died of wounds) amounted to half of the other ranks, and three-quarters of the officers, who went over the top on 1 July. The vast majority of this carnage was done by about 100 machine-guns.

The machine-gun was able to determine the course of the Battle of the Somme in a way that would not have been thought possible two years earlier. Most armies recognized the value of the machine-gun in 1914, but it was under conditions of trench warfare that it showed its potentially decisive importance.

***All the mud and discomfort of the trenches is epitomized in this photograph of a ration party of the Royal Irish Rifles waiting to move up on the fateful day of 1 July 1916. Despite the awful conditions some of these soldiers can still raise a smile for the camera, but for how long?***

# The Somme

Since the industrial revolution, tactics have often lagged behind technology. Just as the British army tactics were inadequate to deal with opponents armed with Mauser magazine rifles at the start of the Boer War, or the Israeli army was surprised by the anti-tank guided missile at the start of the 1973 Middle East War, the machine-gun mandated a new era in battlefield tactics.

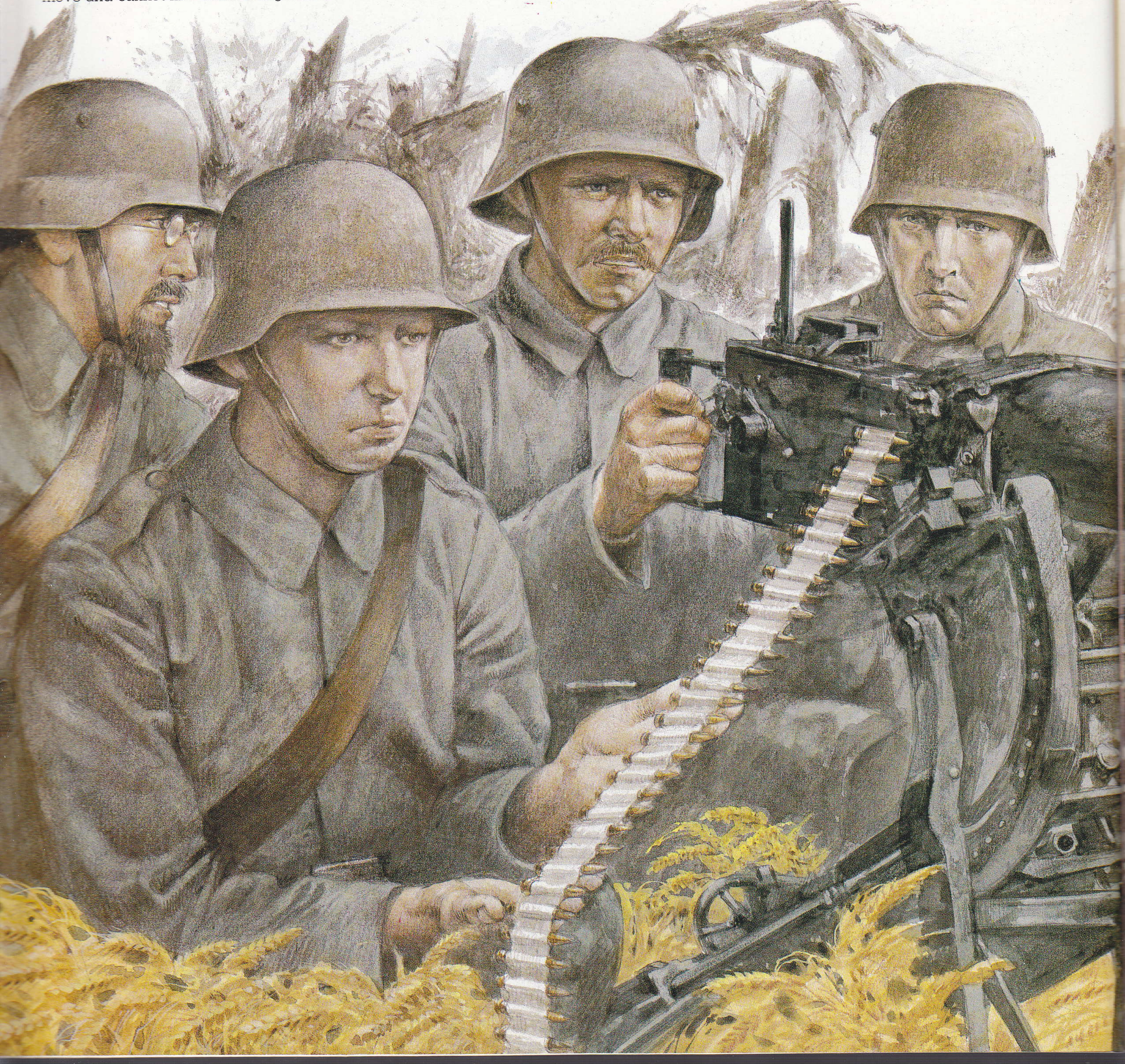
## Fire and movement

On the Somme the machine-gun was primarily a defensive weapon. Because the Germans were on the overall defensive their machine-guns had a greater opportunity to shape the battle. The two basic elements of tactics are fire and movement. Tripod-mounted medium machine-guns are hard to move and cannot fire while doing so. Both the British and the Germans had recognized this in 1914, and had deployed light machine guns (the British Lewis Gun and the German Bergmann gun) that allowed attacking infantry to carry their machine-guns forward where the medium machine-guns could not go. Light machine-guns saw extensive use on the Somme.

The British were the first to realize, however, that if you want to make a machine-gun that is truly capable of both fire and movement, it had to be put in a self-propelled armoured mount capable of moving over the battlefield: in short, a tank. These vehicles first appeared in the later stages of the battle, on 15 September 1916. The machine-gun had created the problem of trench warfare. It also provided a solution.

Machine-guns, especially the tripod-mounted medium machine-guns, are most effective on the defensive to a large part because, even if they are pushed forward, it is hard to replace the tremendous quantities of ammunition they consume in action. The German machine-guns on 1 July all had large stores of pre-positioned ammunition, whereas ammunition for the Lewis guns the British brought with them had to be carried across no man's land by carrying parties.

The machine-gun not only fires more rapidly than a rifle but it is much easier to direct and control. In action it is hard for officers and NCOs to direct the fire of riflemen, much easier to direct a single machine-gun. In modern warfare riflemen are frequently reduced to the position of bystanders by the feeling that their own weapons are inadequate: in World War II, US Brigadier-General S.L.A. Marshall found that often only 10 to 15 per cent of riflemen



actually fired their rifles in combat. Machine-gunners, however, almost always fired.

The machine-gun crews of World War I knew they were the primary target for all the firepower that could be directed against them. They also knew that few infantrymen took machine-gunners prisoner. Yet the German machine-gunners on 1 July manned their weapons until they repulsed the attacks aimed against them or perished under the sword bayonets of the Lee Enfields. In the words of Lieutenant-Colonel A. Carton de Wiart, VC, 'The German machine-gunners were outstanding, almost invariably very brave men and the pick of the German Army'. The British Army called its Machine Gun Corps 'The Suicide Club'. Their German counterparts might well have done the same.

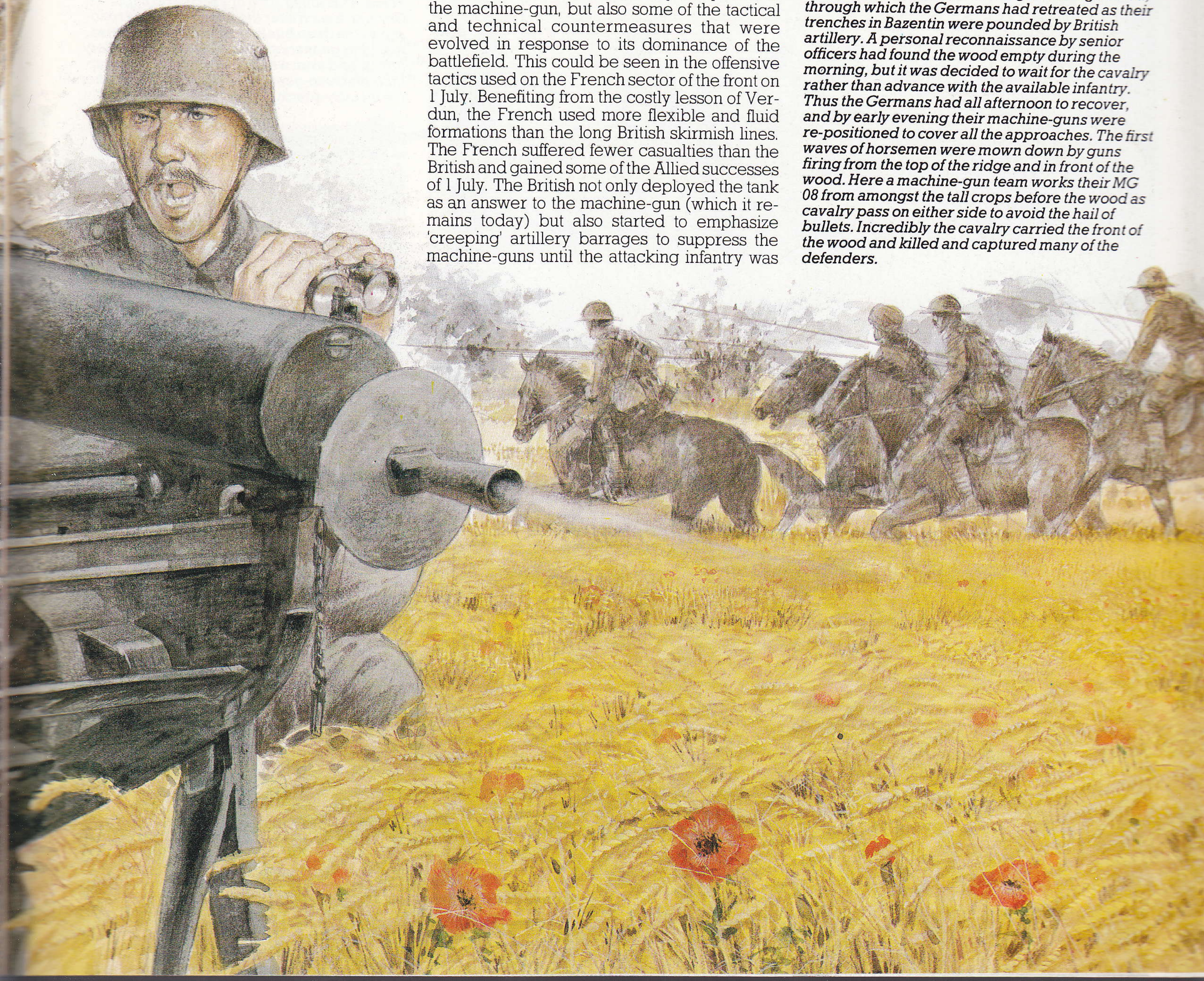
The nature of the Somme emphasized the German use of machine-guns, but this did not mean that the British did not use their machine-guns effectively as well. Technically, they were more advanced than the Germans in some regards, as was demonstrated by their capability for delivering supporting fire over the head of advancing troops. In the later stages of the battle, Vickers guns would fire extensive 'barrages', often ranged in like artillery to fire indirectly, to protect the flanks of advancing units and to interdict German movement.

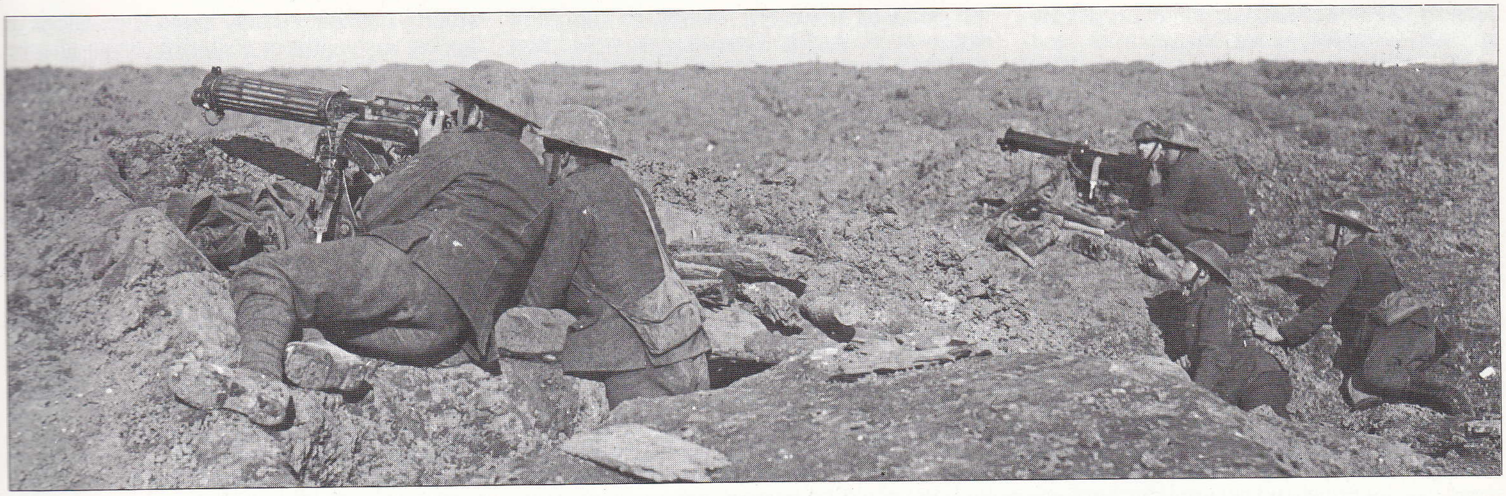
German defensive tactics on the Somme were based on counterattacking any British penetration of their defences almost immediately, before the British could bring in their reserves and consolidate the position. These counterattacks resulted in heavy German losses but time after time pushed the British back from hard-won objectives including, on 1 July, the Schwaben Redoubt and Thiepval Wood, where the 36th Ulster Division was repulsed. These counterattacks would have been more successful were it not for the Lewis guns carried by assaulting British troops. While Lewis guns (unlike the heavier tripod-mounted Vickers) could be carried into an attack, they were not very effective against dug-in positions. It was in support of infantry cleaning out strongpoints and in defeating counterattacks that the Lewis showed its value on the Somme, and the numbers of Lewis guns carried by British infantry was increased as a result.

The Somme showed not only the power of the machine-gun, but also some of the tactical and technical countermeasures that were evolved in response to its dominance of the battlefield. This could be seen in the offensive tactics used on the French sector of the front on 1 July. Benefiting from the costly lesson of Verdun, the French used more flexible and fluid formations than the long British skirmish lines. The French suffered fewer casualties than the British and gained some of the Allied successes of 1 July. The British not only deployed the tank as an answer to the machine-gun (which it remains today) but also started to emphasize 'creeping' artillery barrages to suppress the machine-guns until the attacking infantry was within a bayonet's reach. In the later stages of the battle the British shifted to dawn attacks (such as that which took much of Bazentin Ridge on 14 July), dusk attacks (as on the Ancre Heights on 1 October), and night attacks (as that on Delville Wood on 22/23 July, the wood being secured by 26 July). The effectiveness of the machine-gun put an increased premium on operations at night and in decreased visibility, which is why in June 1982, the British Army launched their attack on the Argentine defences around Port Stanley at night.

Machine-guns are just as deadly today as they were on the Somme. The British Expeditionary Force of 1916 shows that all the bravery in the world cannot triumph by itself against the hard realities of modern warfare. By using tanks, more effective and responsive artillery to suppress the machine-guns, less vulnerable infantry tactics, attacking in conditions of reduced visibility, there has never been a repeat of 1 July 1916.

*At 7 pm on 1 July 1916 the 7th Dragoon Guards and the Deccan Horse launched a classic cavalry charge, the last of its kind to be seen on a Western European battlefield. Their target was high wood, through which the Germans had retreated as their trenches in Bazentin were pounded by British artillery. A personal reconnaissance by senior officers had found the wood empty during the morning, but it was decided to wait for the cavalry rather than advance with the available infantry. Thus the Germans had all afternoon to recover, and by early evening their machine-guns were re-positioned to cover all the approaches. The first waves of horsemen were mown down by guns firing from the top of the ridge and in front of the wood. Here a machine-gun team works their MG 08 from amongst the tall crops before the wood as cavalry pass on either side to avoid the hail of bullets. Incredibly the cavalry carried the front of the wood and killed and captured many of the defenders.*





*Above: In action the Machine Gun Corps was not averse to using captured weapons, as shown by this photograph of a British team using a sMG 08. The team in the foreground are using a Vickers machine-gun. Using the Maxim mechanism of the sMG 08 presented no problems to Vickers-trained machine-gunners.*

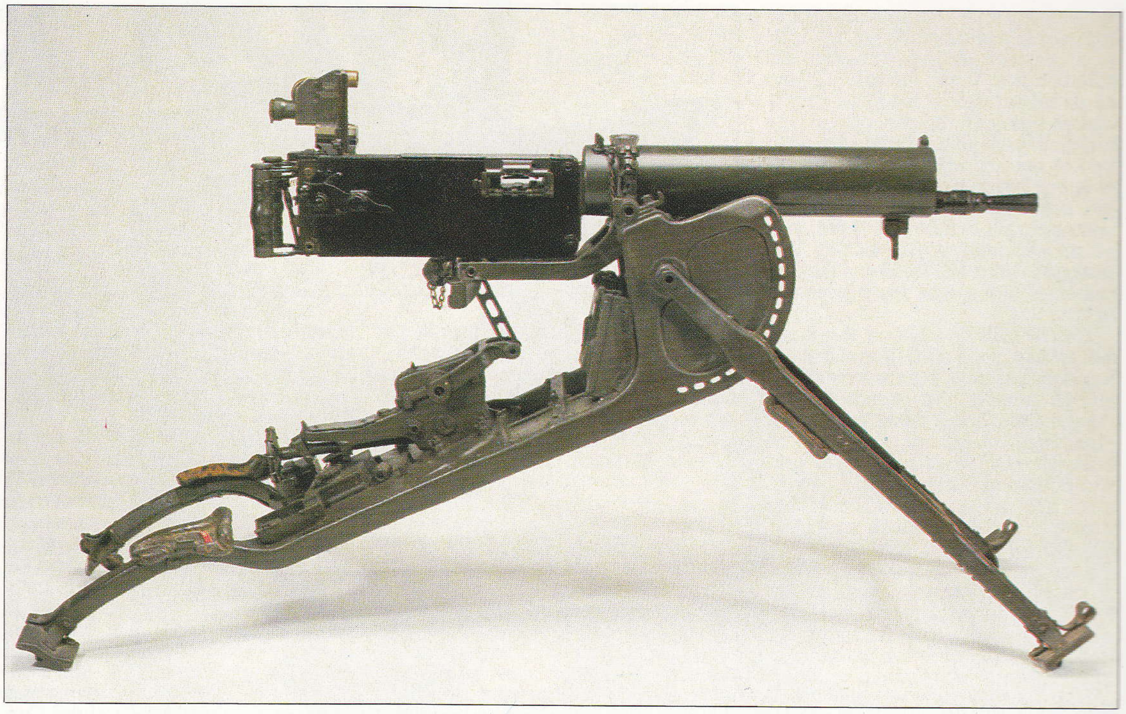
*Below: This illustration of a section of captured German trench near the Albert-Pozières road shows the deep bunkers in which the German machine-gunners sheltered during an artillery attack, and from which they emerged to set up their machine-guns once the attack lifted to herald the infantry attack.*

*Below: A German view of the British infantry advancing over the open terrain near Mametz on 1 July 1916. Presented with such a target the German machine-gunners could not fail to halt such an attack in its tracks, especially when the advancing lines moved across the path of enfilading fire from both sides.*

*Above: Troopers of the Deccan Horse await their chance to advance during the action at Bazentin Ridge on 14 July 1916. The call never came, and all the cavalry were able to do was clutter the rear areas and make undue demands on the supply lines for fodder for their horses. They were unable to advance against machine-guns.*

GERMANY

# Maschinengewehr 08



*The schwere Maschinengewehr 08 (sMG 08) was the standard German machine-gun of World War I and used the basic Maxim system unchanged. It was a very heavy weapon capable of a prodigious amount of fire. Emplaced in well-constructed dugouts protected by dense thickets of barbed wire, it took a fearful toll of Allied troops.*

Contrary to general belief, the German army was not an avid proponent of the machine-gun when Hiram Maxim started to demonstrate his product around the European capitals in the 1890s. His gun aroused some interest but few sales, and the first made to the German army were actually paid for out of the private funds of Kaiser Wilhelm II. Thereafter things began to look up and gradually a licensing agreement was made between Maxim and the German army. From this agreement Maxim machine-guns were soon being produced by both commercial concerns and the Deutsche Waffen und Munitionsfabriken at Spandau, near Berlin. Several models were produced before the 'standard' weapon appeared in 1908 as the **schwere Maschinengewehr 08**, or **sMG 08**. It fired the standard 7.92-mm (0.312-in) rifle cartridge of the day.

As a machine-gun the sMG 08 differed little from many other Maxim guns, and the Maxim recoil-operated mechanism was used unchanged. Construction was very solid, and once in service the **'Spandau'** proved to be very reliable under the most demanding battlefield conditions. Where the sMG 08 did differ from other machine-guns of the time was the mounting. Even the early German Maxims used a type of mounting known as a *Schlitten* (sledge) that was intended to be dragged across country when folded with the gun on top. As an alternative this mounting could be carried by two men as if it was a stretcher. The mounting, known as the Schlitten 08, provided a stable firing platform but was very heavy, to the extent that in 1916 an alternative tripod mounting known as the Dreifuss 16 was introduced.

During World War I the sMG 08 took a fearful toll of the Allies' manpower strengths. It was usually the sMG 08 that was responsible for mowing down the massed infantry attacks of 1914 to 1917, for after 1914 the numbers of machine-guns used by the German army increased greatly and (probably more important) the Germans learned to use them widely. Instead of simply placing a machine-gun to face directly across no man's land, the Germans learned to set them up firing to a flank so that one gun could enfilade and break up an infantry attack to much better effect, while at the same time providing more cover for the gun crew. The German machine-gunners were picked men who often maintained their guns in action to the last, and they were highly trained in all aspects of their task. They knew the sMG 08 backwards and could carry out repairs in the front line if need arose.

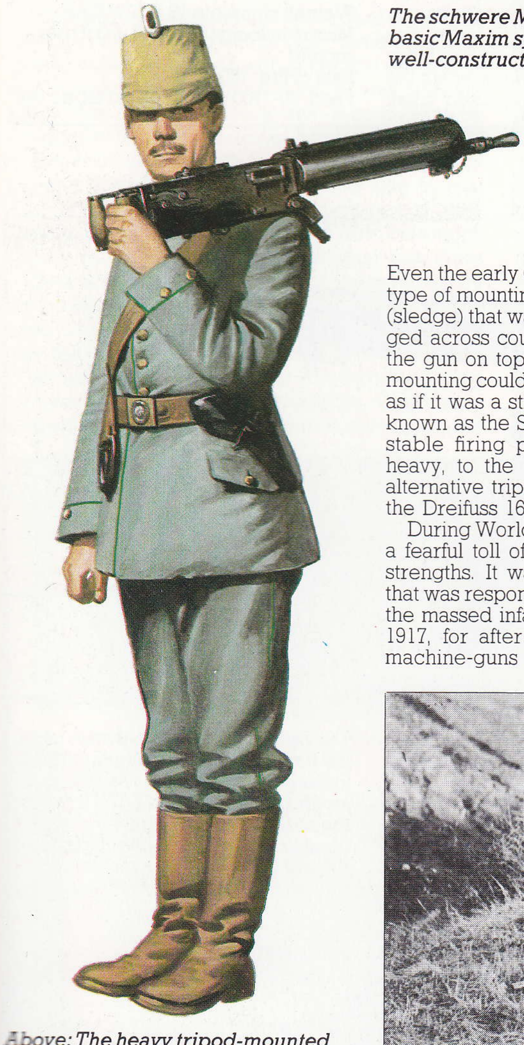
At times two or three men using a single sMG 08 could break up entire Allied infantry battalions once the latter had left the shelter of their trenches. The slaughter of Neuve Chapelle, Loos, the Somme and all the other costly infantry carnages can be traced to sMG 08s and their determined crews.

After 1918 the sMG 08 was maintained in German service, and many were still in use when 1939 came around, but by by then they had been relegated to second-line duties.

## Specification

**sMG 08**

**Calibre:** 7.92 mm (0.312 in)
**Lengths:** gun 1.175 m (46.26 in); barrel 719 mm (28.3 in)
**Weights:** gun complete with spares 62 kg (136.7 lb); sledge mount 37.65 kg (83.0 lb)
**Muzzle velocity:** 900 m (2,953 ft) per second
**Rate of fire:** 300-450 rpm
**Feed:** 250-round fabric belt

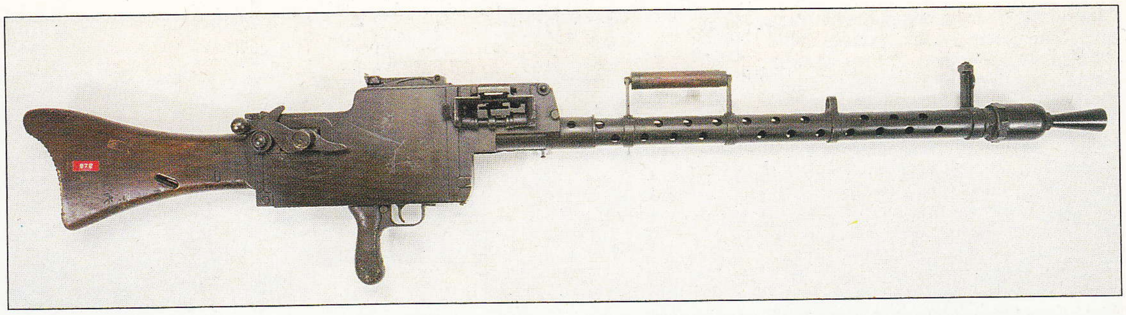


*Above: The heavy tripod-mounted guns in service in 1914 had to be broken down into several loads for prolonged marching. Here a Jäger (light infantryman) in 1914 service kit shoulders the burden of the sMG 08.*

*Bulgarian machine-gun teams in action use Maxim Model 1908 machine-guns purchased from Vickers in the United Kingdom. These guns fire an 8-mm (0.315-in) cartridge and were very similar to the German sMG 08.*

GERMANY

# Maschinengewehr 08/15



***The MG 08/18 was the last of the World War I versions of the sMG 08 to see service. It used an air-cooled barrel without the usual large casing and was an attempt to provide German troops with a light machine-gun.***

By 1915 the German army had come to appreciate that there was a need for some form of light machine-gun for front-line use. While the sMG 08 was an excellent heavy machine-gun, it was too heavy for rapid tactical moves and trials were held to determine what type of weapon would suffice. Among weapons tested was the Danish Madsen, and light Bergmann and Dreyse machine-guns, but the choice fell upon a lightened form of the sMG 08. This emerged as the **MG 08/15** and the first examples of the type were issued in 1916.

The MG 08/15 retained the basic mechanism of the sMG 08 and the water cooling system, but the water jacket was smaller; the receiver walls were thinner, some detail parts were eliminated, a bipod replaced the heavy sled mounting, and a pistol grip and butt were added; some changes were also made to the sights. By no stretch of the imagination could the MG 08/15 be called light, for it still weighed a hefty 18 kg (39.7 lb), but it was portable and could even be fired from a standing position with the weight taken by a sling. A shorter fabric belt was introduced to make handling easier, or a belt drum could be fitted to the side of the weapon to prevent feed belts dragging in the mud.

The choice of the basic sMG 08 mechanism meant that no additional training was required to use the lighter weapon, and there was a fair degree of spares interchangeability. Late in the war the designers went one stage further and did away with the water-cooling jacket altogether to produce the **MG 08/18**. The war ended before this version could be widely used, the few that were produced being issued to the more mobile units of the German army; few actually reached the front-line infantry.

There was one further variant of the MG 08/15 known as the **LMG 08/15**, where the L denoted *Luft* (air). This version was one of several air-cooled machine-guns used in fixed mountings by the new German air arm and was basically an MG 08/15 with a perforated water jacket to allow air-cooling of the barrel. The guns were fired via a cable and were synchronized so as not to shoot through the aircraft propeller. Ammunition was fed into the gun from a drum and another spring-loaded drum was often used to prevent the used fabric belt flapping around in the slipstream. Some of the early Maxim aircraft guns had been lightened sMG 08 models known as the **LMG 08**, but these passed out of use once the LMG 08/15 was established.

The ground-used MG 08/15 equipped front-line troops at company level and below, while the heavier sMG 08 was retained at battalion level or even deployed in special heavy machine-gun companies. The portability of the MG 08/15 enabled it to be used by the *Sturmtruppen* of 1917 and 1918, but it was never a handy weapon to use in action: in comparison with other light machine-guns of the period it was much larger and bulkier. But it remained every bit as reliable in action as its large counterpart and the German troops were well trained in its use. Perhaps the most effective use was made of the MG 08/15 during the latter stages of the 1918 campaign, when the retreating German army used small MG 08/15 teams to cover its withdrawals, single weapons sometimes holding up whole battalions and preventing the Allied cavalry from taking part in any action.

### Specification

**MG 08/15**

**Calibre:** 7.92 mm (0.312 in)

**Lengths:** overall 1.398 m (55.0 in); barrel 719 mm (28.3 in)

**Weight:** complete 18 kg (39.7 lb)

**Muzzle velocity:** 900 m (2,953 ft) per second

**Rate of fire:** 450 rpm

**Feed:** 50-, 100- or 250-round fabric belt

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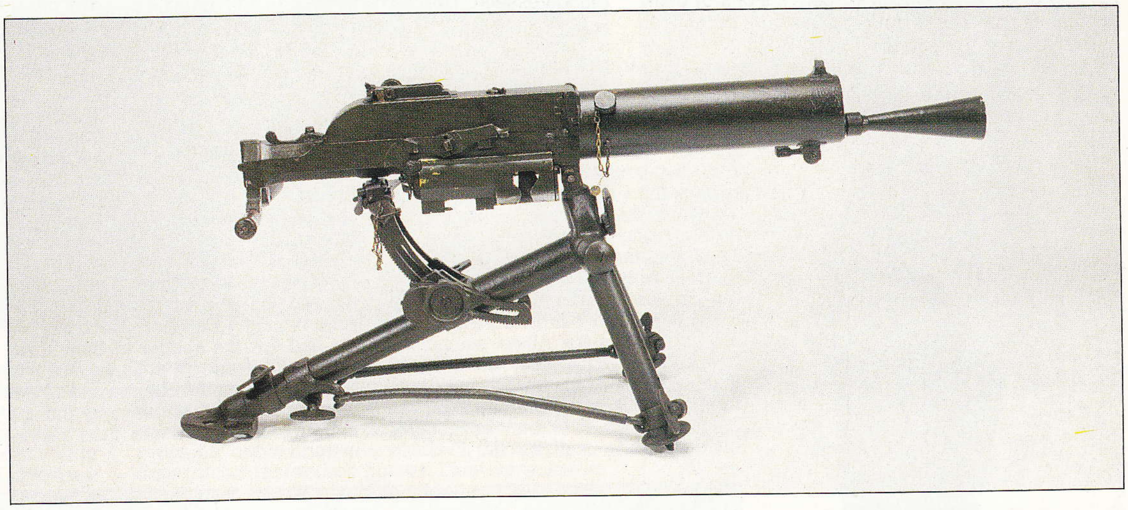
AUSTRIA-HUNGARY

# Schwarzlose machine-guns



***The Austro-Hungarian armies used the heavy Schwarzlose machine-gun in several forms, most of them looking very like this M 07/12. It used the blow-back principle for operation and was very reliable even though early models used an oil pump to lubricate the ammunition.***

The first indigenous Austro-Hungarian machine-gun was invented by one Andreas Schwarzlose in 1902, and was later manufactured at the Waffenfabrik Steyr. The first model was the **Schwarzlose Maschinengewehr Modell 07**, soon followed by the **MG Modell 08** and the full standard model, the **MG Modell 12**, to which standard the two earlier models were later converted by the Austro-Hungarian armed forces. There was little of note to mention between all these various models, for they all used an identical method of construction and the same operating principle.

The Schwarzlose machine-guns were all heavy belt-fed and water-cooled weapons working on an unusual principle, namely that known as delayed blow-back, in which the recoil forces impinge to the rear upon a heavy breech-block held in position (with the spent case still in the chamber) by a levered mechanism. Only after a short period of time has elapsed do these levers move sufficiently for the breech block to travel to the rear; this time is just long enough for the bullet to leave the muzzle and for the pressure in the barrel to fall to a safe limit. But the system means that the barrel length is limited: too long a barrel and the breech opens before the bullet has left the muzzle. So the operating system is a compromise between cartridge propellant strength, barrel length and the delayed-action lever timing.

In practice the Schwarzlose machine-guns worked well enough, but the barrel used was really too short for the standard Austro-Hungarian 8-mm (0.315-in) cartridge of the period, and this resulted in excessive muzzle flash. As a result a long tapering flash hider had to be fitted, and this became one of the distinguishing features of the Schwarzlose. Another design feature of the series was the feed, which was amongst the first to use a drive sprocket to carry a cartridge into the system in a very precise manner. This added to the overall reliability of the Schwarzlose weapons.

Between 1914 and 1918 the main operators of the Schwarzlose were the Austro-Hungarian armies, but later in the war Italy had also become a major user, mainly by means of captured weapons. The Netherlands was another major buyer, but was a neutral during World War I. By 1914 nearly all the versions in use were the 07/12, 08/12 and 12 models. The original Modells 07 and 08 used lubricated ammunition, but on the Modell 12 this feature was eradicated and the earlier models were modified up to Modell 12 standards. There was also a **Modell 07/16** intended for use on aircraft and featuring a rudimentary system of air-cooling, but it was not a great success and not many were produced.

All the Schwarzlose machine-guns were large and heavy weapons notable for the excellence of their manufacture. Indeed, they were so heavy and well made that few appear to have worn out, so that many were still in service during 1945 in Italy and Hungary. The delayed action blow-back system has not been widely copied, and is now regarded as an oddity.

### Specification

**Modell 07/12**

**Calibre:** 8 mm (0.315 in)

**Lengths:** gun 1.066 m (41.97 in); barrel 526 mm (20.71 in)

**Weights:** gun 19.9 kg (43.87 lb); tripod 19.8 kg (43.65 lb)

**Muzzle velocity:** 620 m (2,034 ft) per second

**Rate of fire:** (cyclic) 400 rpm

**Feed:** 250-round fabric belt

Armed Forces of the World

# Soviet Navy

## Part 2

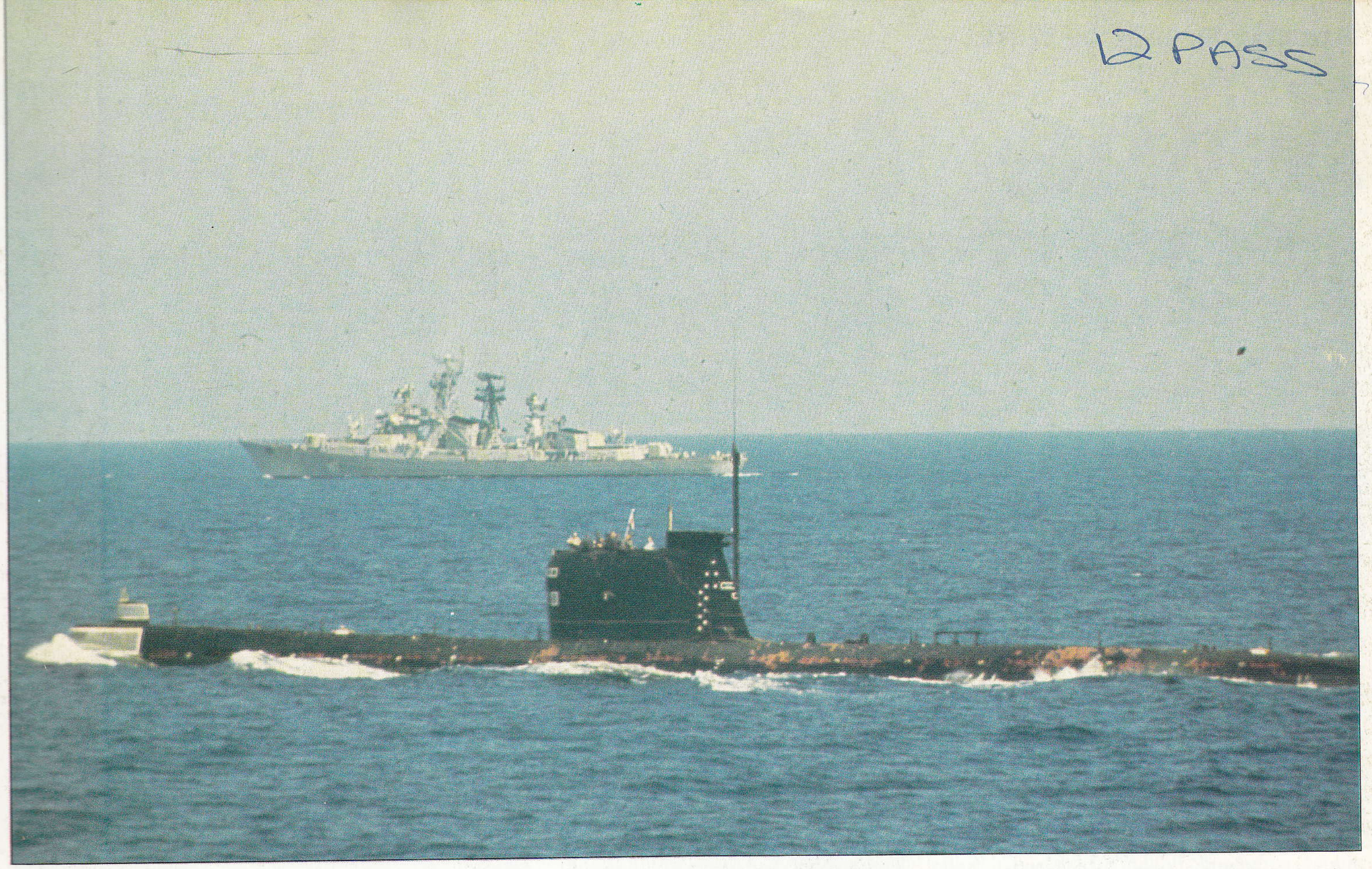
The main threat to American and allied surface ships and sea lines of communications comes from the Soviets' force of attack submarines. By mid-1984 this force comprised six 'Alpha', 12 'November', 16 'Victor I', six 'Victor II, 18 'Victor III', One 'Mike', one 'Sierra' and five 'Echo' class nuclear-powered attack boats (or SSNs), plus two 'Oscar', one 'Papa', 11 'Charlie I', six 'Charlie II' and 29 'Echo II' nuclear-powered cruise-missile submarines (or SSGNs) forming the main strike element. To back up the nuclear-powered vessels there are also 16 'Juliett' class conventionally-powered cruise-missile carriers and 50 'Foxtrot', 10 'Romeo', four 'Zulu', 50 'Whiskey', 18 'Tango' and four 'Kilo' class conventionally-powered attack submarines. An additional 10 'Foxtrots', six 'Zulus' and 80 'Whiskeys' are held in reserve for use in wartime. The Soviet navy is currently in a transitional phase of submarine construction, with the third-generation programmes now ending and the fourth-generation ones just starting. The submarine classes making up this latter cycle are the 'Oscar', 'Mike', 'Sierra' and 'Kilo' designs, which are replacing the obsolete first-generation vesels such as the 'November' class of SSN.

In the Soviet navy submarines are divided by function into one of four main groups, namely ballistic-missile (which was dealt with in the first part of this study), command, cruise-missile and torpedo attack. The command designation is believed to be assigned to three converted ex-ballistic missile 'Golf I' vessels (now fitted with extensive command, control and communications facilities for use at sea) plus other as yet unspecified conversions of older nuclear boats. These four groups are then additionally classified according to whether they have nuclear or diesel-electric propulsion systems. If they are nuclear-powered the craft are grouped into divisions of between eight and 12 units. All the submarines in a particular division have the same type of armament. The next higher command grouping for nuclear-powered boats is the flotilla, which comprises four or five divisions and thus may consist of between 35 and 64 units in total (including command vessels). The flotilla's individual divisions are equipped with different armaments, although there may well be two or more divisions equipped with either torpedoes or cruise missiles within the flotilla as a whole. Conventionally-powered submarines differ in their grouping in that there are three distinctive command structures, the brigade of some eight to 16 boats which can then form part of either a division (with two or three brigades) or a squadron (with four to six brigades).

*The 'Victor III' SSN is the best of the 'Victor' series of nuclear attack submarines. It is said to be equivalent in quietness to the American Sturgeon class of SSN and has the added advantage of a Clusterguard anechoic coating.*

*Second of the 'Kiev' class aviation ships was the* Minsk. *The class was preceded into service by the two 'Moskva' class helicopter carriers, which gave the Soviet navy its initial experience of operating large numbers of helicopters at sea in one platform.*

12 PASS

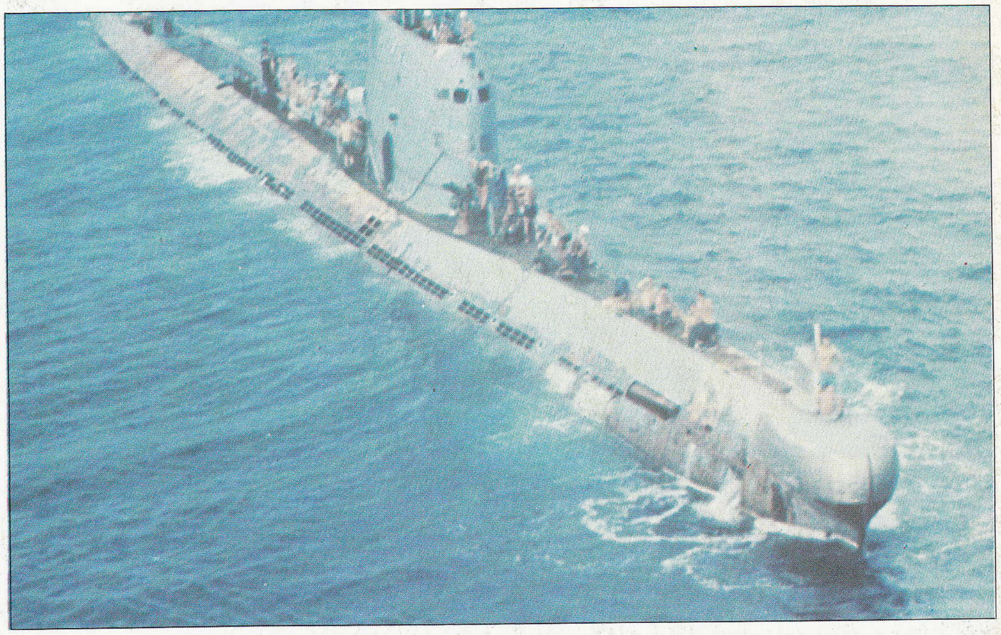


*A 'Foxtrot' class conventional attack submarine of the Northern Fleet is shown with a 'Kashin' class large anti-submarine ship of the Black Sea Fleet during their deployment with the Soviet Mediterranean Squadron.*

The actual structure adopted and its specific composition depends upon the particular fleet area. The Northern Fleet has 138 active nuclear- and conventionally-powered attack submarines, and provides from its resources at any one time between six and eight 'Foxtrot' and 'Tango' conventional attack, one 'Juliett' conventional cruise missile, one 'Echo II' SSGN cruise missile and the occasional 'Victor' class SSN to the Soviet Mediterranean Squadron to form its undersea component. The Baltic and Black Sea Fleets have no nuclear units permanently attached, and instead rely on around two dozen conventional attack submarines, the Black Sea Fleet having several of the 'Tango' class. The Pacific Fleet, in contrast with these two latter fleets, has 102 submarines of the same types used in the Northern Fleet with a growing number of modern vessels built in the area at Komsomolsk. Its SSGN force relies heavily on approximately half the 'Echo II' class, but 'Charlie I' units are known to be assigned to the fleet as one sank recently and was then raised in an immense salvage operation. The SSNs are represented by a number of the first-generation 'November' class, but these are being supplanted by 'Victor Is' transferred from the Northern Fleet and 'Victor IIIs' locally built. There are large numbers of 'Foxtrot' and 'Whiskey' class conventional submarines, together with several 'Julietts' and a growing number of 'Kilo' class units.

In terms of armament types, all except the Baltic Fleet have available the full spectrum of submarine torpedoes, missiles and mines. It should be noted that the latest Soviet submarine classes have been constructed with torpedo tubes of a calibre well in excess of 533 mm (21 in), and that older classes are believed to be undergoing modification to carry these tubes. The weapon fired from the new tube is powered by a combined steam-oxygen propulsion system and has a wake-homing guidance head. The performance credited to the torpedo is considered to be far in excess of any NATO heavyweight torpedo in service now or due to enter service within the next decade or so. Ranges of 50 km (31.07 miles) at 50 kts or 100 km (62.1 miles) at reduced speed of 30 kts have been quoted. Together with other Soviet long-range weapons (such as cruise missiles and the SS-N-15 and SS-N-16 ASW weapons), the new torpedo accords nicely with the Soviet navy's concepts of engaging targets from as great a range as possible in order to achieve a 'surprise' first strike.

To aid in such a strike the Soviet navy has a number of missile-carrying bombers that form part of the Soviet naval aviation. This command is directly subordinated to the Soviet navy's main headquarters near Moscow, and is divided into air divisions (each of two or three strike regiments) assigned to each of the four fleets under an aviation officer who reports directly to the fleet commander. The reconnaissance, the fixed- and rotary-wing ASW, and the transport elements which form the remainder of each fleet's air component are organized into independent regiments and squadrons.



*Armed with six 533-mm (21-in) torpedo tubes forward and four 406-mm (16-in) tubes at the stern, the 'Foxtrots' were a highly successful design. Sixty-two were built out of a planned total of 160 before production of nuclear boats superseded that of conventional craft. Providing the bulk of the submarine strength of the Soviet Mediterranean fleet, 'Foxtrots' have also been supplied to Cuba, India and Libya.*